May 11, 1929 *A McGraw-Hill Publication* 20 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine

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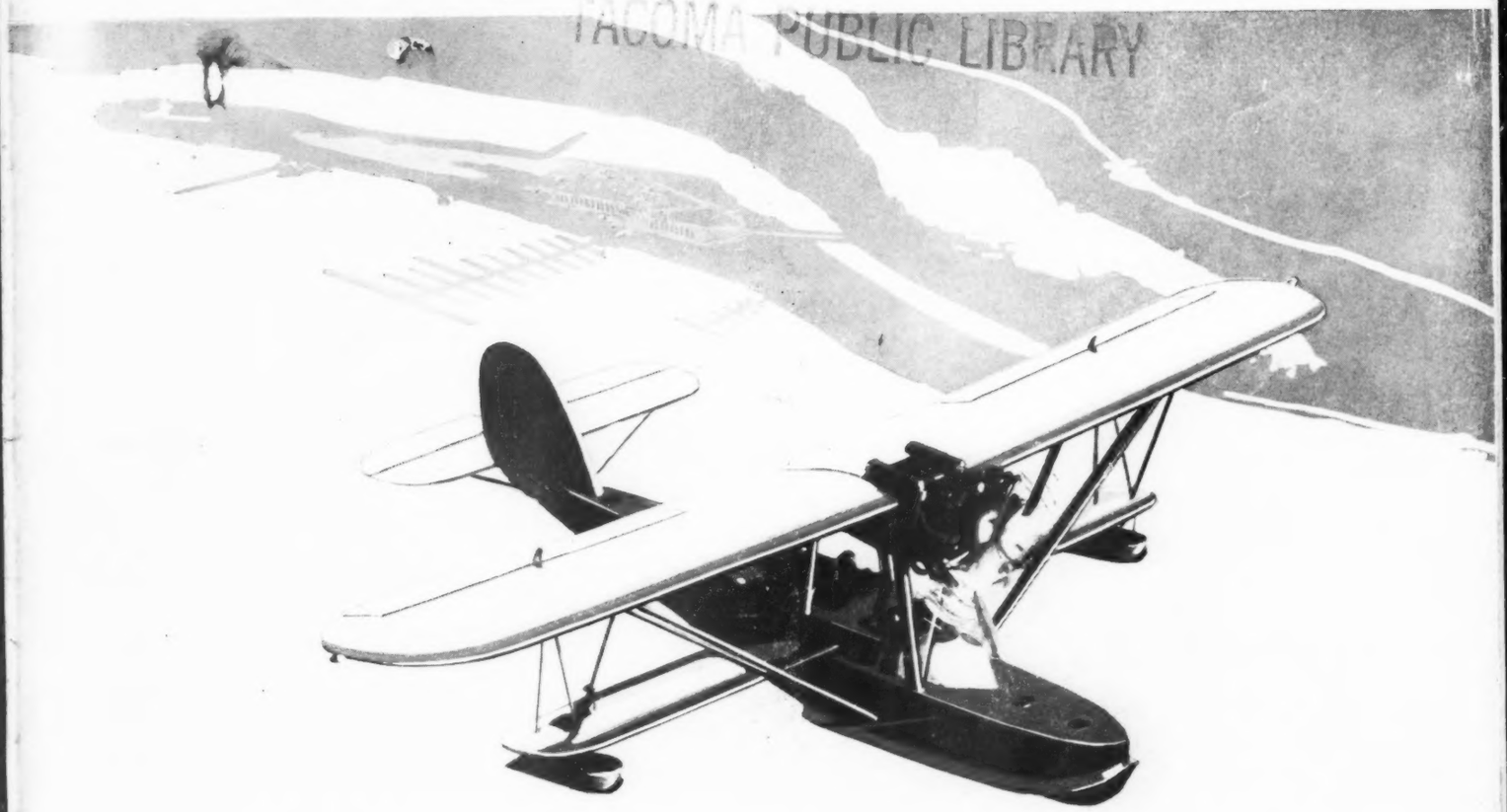
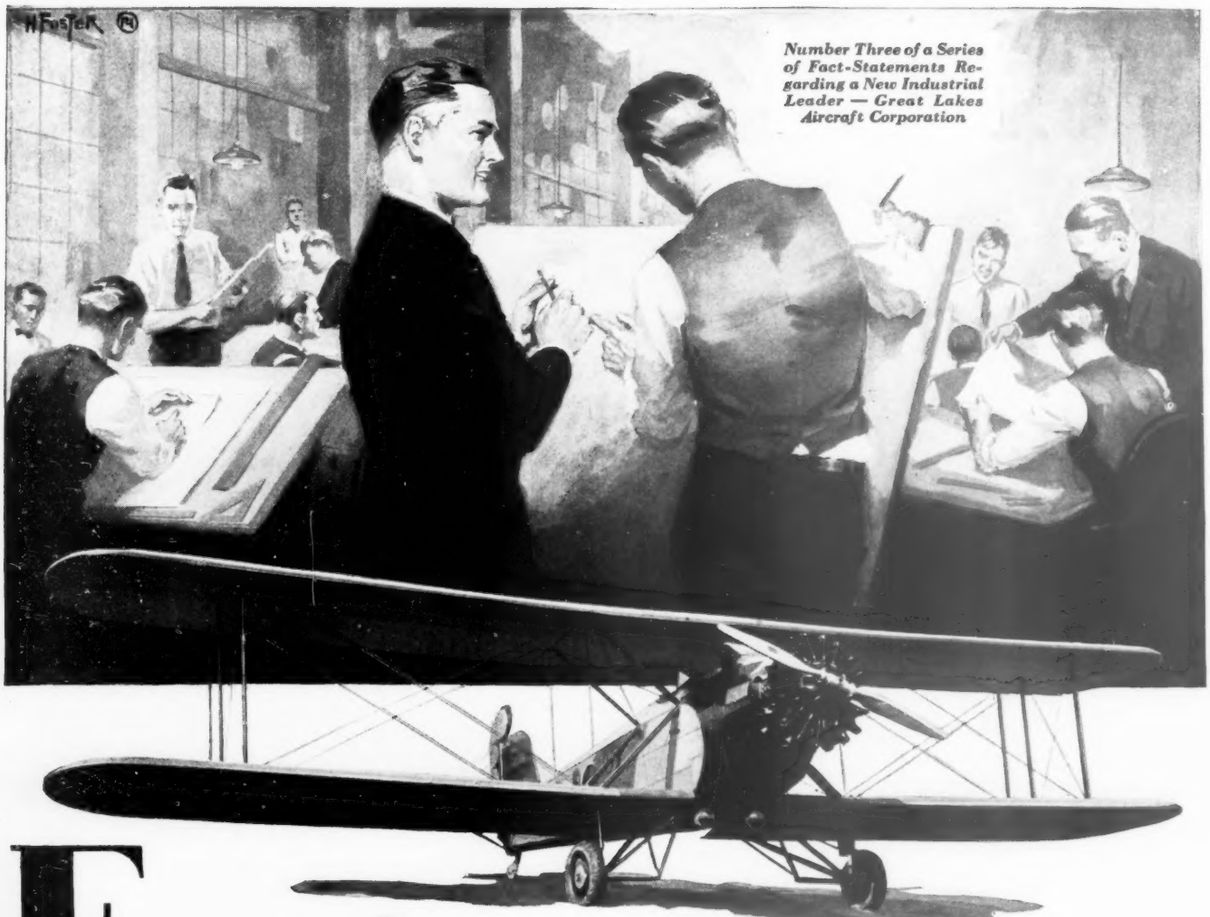


SPECIAL FEATURES

PLANES THAT *Fly* OR PLANES THAT *Earn?*

SYSTEM AND ORDER IN THE *Stock Room*

THE *LeBlond Sixty* (MODEL 5-D)



Number Three of a Series of Fact-Statements Regarding a New Industrial Leader — Great Lakes Aircraft Corporation

Engineering

IN the fast-fading days of small production in the aircraft industry, successful concerns have been built around the engineering ability of a single designer. The day is already here, however, when individual effort, be it ever so brilliant, must yield to superior force of numbers—when the one-man engineering department must be replaced by a group of trained specialists working in harmony toward a common end.

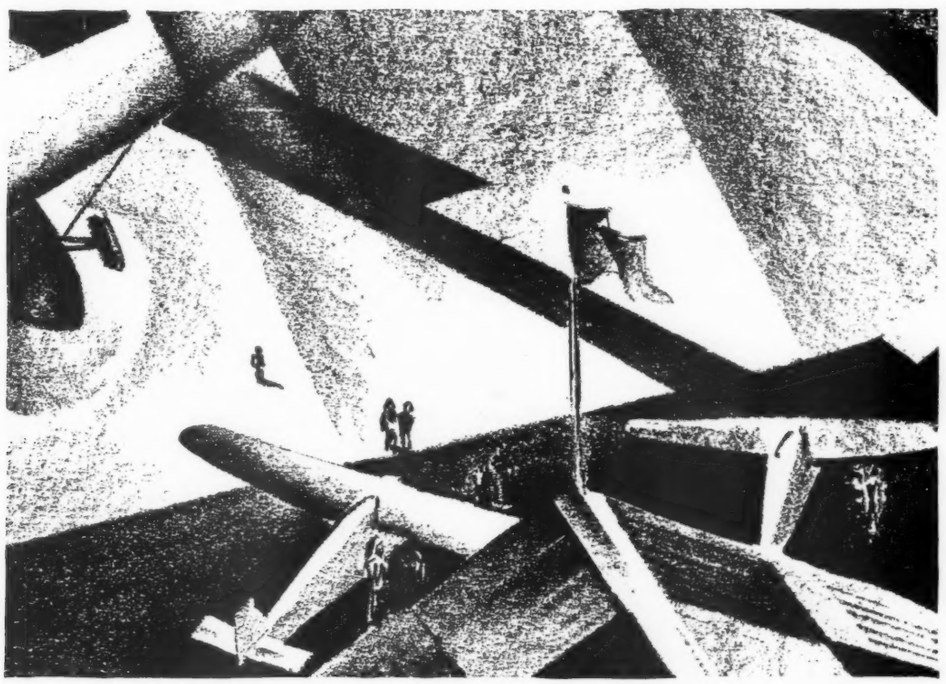
Great Lakes aircraft design, consistent with this Corporation's broad view of the commercial aviation field, owes its superiority to the coordination of such an engineering group. Great Lakes engineering problems have the benefit, not of one designer, but of many. Not of a few years of experience, but of close to a hundred. Designs of proven merit evolve easily and naturally from this wealth of experience and ability. Wings, fuselage, empennage, undercarriage, floats, power plant—each separate element of the projected whole has the undivided attention of a specialist in that particular phase of aero engineering. The results, spelled out in terms of quality and performance, are daily writing new pages in aviation history.

GREAT LAKES AIRCRAFT
CORPORATION CLEVELAND

AVIATION, May 11, 1929. Vol. No. 26, No. 19. Published weekly. McGraw-Hill Publishing Company, Inc., New York, N. Y. Domestic $4.00 per year; Canada $5.00. All other countries $6.00; 20 cents a copy. Entered as second-class matter, July 27, 1928, at the post office at New York, N. Y., under the act of March 3, 1879.

1381

No flying gravel or dust
on firm, smooth Tarvia aprons



AVIATORS and airplane mechanics are quick to appreciate the firm, dustless surface of Tarvia aprons. On them tuning-up hazards simply don't exist—propellers cannot whip up dust and gravel to do damage to the wings and motors of expensive planes.

Constructing a Tarvia apron is not likely to be difficult or expensive. All the 25-year old paving expertness and country-wide service of the Barrett Company is available to the airport engineer.

Barrett engineers know how to utilize local materials to build smooth, dustless Tarvia aprons and resilient, skid-safe, all-weather Tarvia service roads and runways at a cost within the limits of any airport budget. And Tarvia maintenance—always easy and inexpensive—will keep them at the peak indefinitely.

The Tarvia field man will gladly give you all the details. Write, wire or 'phone our nearest office.

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REPAIR and MAINTENANCE

Printed in U. S. A.

"It can't be done", said the aeronautical world . . . BUT FOKKER DID IT!

WHEN Western Air Express, backed by the Guggenheim Fund, prepared to establish the world's model passenger airway between Los Angeles and San Francisco, their staff laid down the equipment requirements which they believed necessary for a dependable and profitable operation.

The specifications called for an airplane combining high cruising speed, moderate landing speed, generous pay load capacity, and other features of comfort and economy never before built into any aircraft.

All of America's best known airplane builders were invited to bid on the production of these planes. Some refused to even attempt to build such a ship. Some offered to attempt it, but without guarantee of success.

Fokker read the specifications . . . and guaranteed unconditionally to meet them.

The Fokker F-10 is the result. It has not only met, but exceeded every one of the requirements. In a year of service for Western Air Express between Los Angeles and San Francisco, these ships have set absolutely perfect records. Western Air Express now operates 14 of them. Already more of these ships are in commercial service than any other plane of their capacity in the world.

They furnish added proof of what has been demonstrated many times before during the past twenty years ***. . . that Fokker designs and construction set the highest standards known in the world of aviation.***

OTHER commercial lines using Fokkers are Universal Aviation Corporation; Texas Air Transport; Standard Air Lines; National Parks Airways; Pan American Airways; Western Canada Airways; Dominion Airways.

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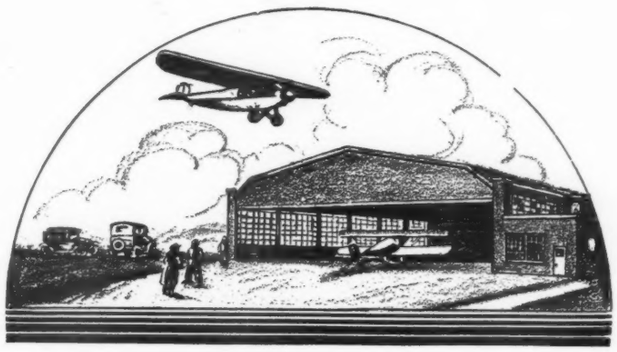

IT is impossible to forecast accurately the nature and volume of air traffic that will pass through and among our cities even ten or twenty years hence. We can only be sure that it will be tremendous—that the expansion of aerial transport from, say, 1930 to 1950 will be at least as great as the expansion of motor traffic between 1895 and 1915 and infinitely greater than the development of railroad traffic in the years from 1830 to 1850. Thus, in future, the economic destinies of our cities will be bound to the air no less than to the land and water. The selection and building of air ports becomes, therefore, a matter of earnest necessity and one demanding most careful investigation. An inadequate or poorly located air port may, in incredibly short time, place a city at serious economic disadvantage. Every one of the technical factors—economic, geological, meteorological—bearing upon the utility of air ports should be analyzed. Moreover, the analyses should be made by experts.

Ford, Bacon & Davis, Inc.

Engineers

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OVER the ice wastes of the Arctics . . . over endless stretches of ocean . . . over cities, forests, mountains . . . Exide Aircraft Batteries have proven their worth. Pilots have found Exides absolutely dependable under every condition encountered by any type of aircraft. That's why flyers choose Exide Batteries. They know them—they have confidence in them.

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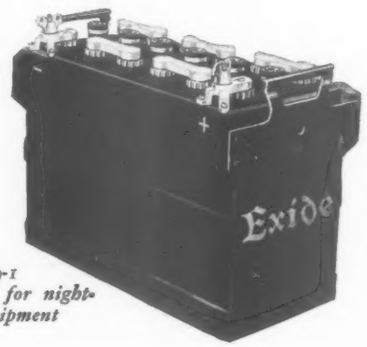

Type 6-TX-19-1 recommended for night-flying equipment

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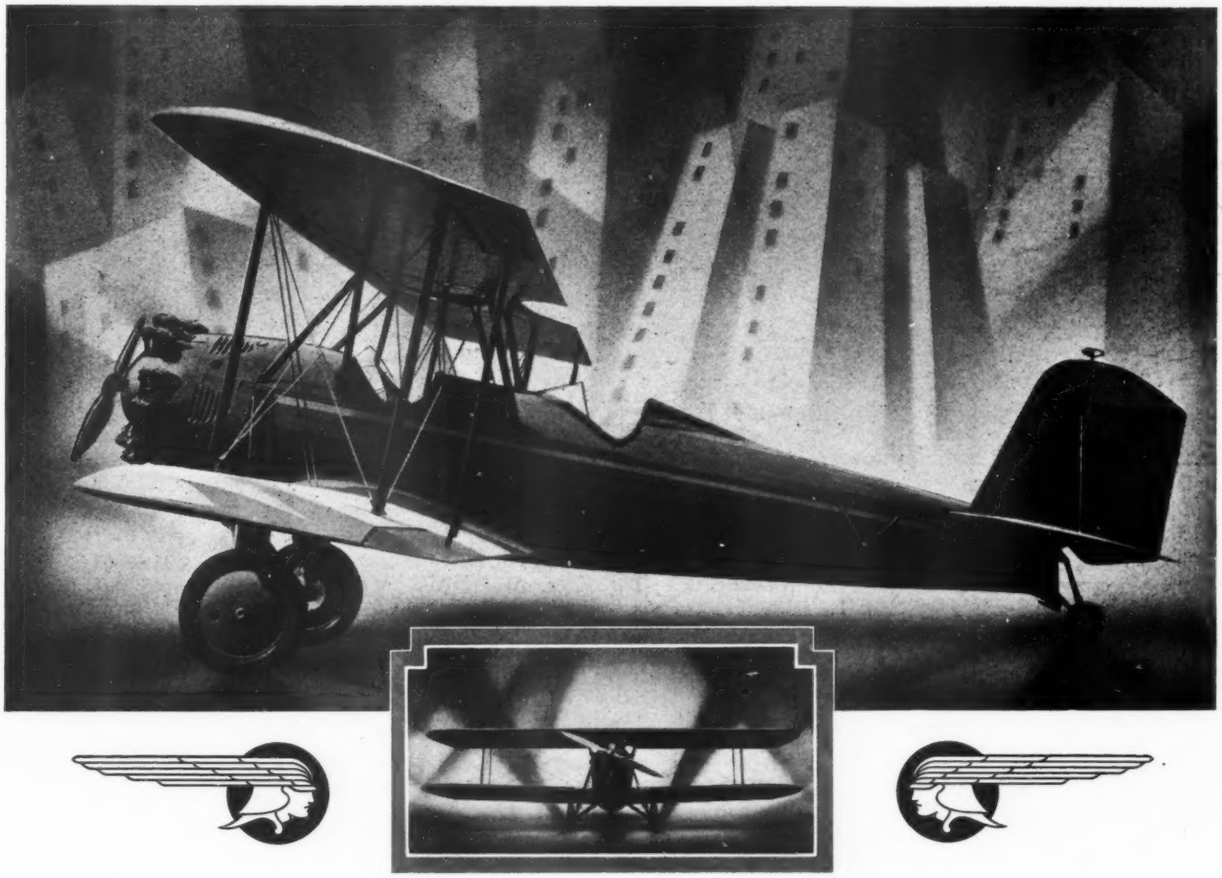
KEEPING PACE WITH THE TIMES



THE time has come when the aeronautic expert, whatever be his field, is no longer the only qualified judge of aircraft quality for inquisitive American nature has resulted in a liberal education of the public in aviation. The surprising thing today is the number of men, women and even children whose airplane conversation runs to the simpler technical terms.

Spartan has recognized that to keep pace with the times the Spartan product must measure up to more than one set of standards. The manufacturer has produced in the Spartan C-3 Challenger shown above, powered with the Curtiss-Challenger 170-horsepower motor, a plane in which the most discriminate expert and the most inquisitive prospect will find satisfaction plus.

The Spartan C-3 Walter, powered with the Improved Walter 130-horsepower, nine-cylinder motor, is another distinctive Spartan product. Details and specifications will be furnished on request.

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Tulsa, Oklahoma.

LUKE and FLUKE . . . . . Luke Doesn't Like Competition

IS IT EASY TO BUILD AN ENGINE, LUKE?
SURE, I COULD BUILD ONE MYSELF
THE FIELD
WHY DON'T YOU?
WELL, SON, I WOULDN'T KNOW WHERE TO GET THE WATER OR AIR TO COOL IT
CAFE
I THINK YOURE TRYING TO KID ME; LUKE, HONEST, WHY DON'T YOU BUILD AN ENGINE?
ALL MY TIME'S TAKEN UP TRYIN' TO TEACH YOU TO FLY!
KEEP OUT
WELL, YOU COULD WORK AT NIGHT COULDN'T YOU?
SURE, I COULD, BUT I AIN'T GOT A NATIONAL CHAIN OF SERVICE STATIONS LIKE CURTISS WILL HAVE THIS YEAR — AND WHAT GOOD IS AN ENGINE WITHOUT NO SERVICE?

The CHALLENGER ENGINE Is Known for Its Aerodynamic Efficiency . . . . . .

"It's A Good Engine"

the Challenger can be more effectively streamlined than the usual single-row radial engine. This is due primarily to the staggered arrangement of cylinders, plus the inherently low frontal area of a short-stroke, large-bore engine. These factors are largely responsible for the excellent performance of Challenger-engined airplanes.

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THE TWIN-ENGINED SIKORSKY AMPHIBION CAN FLY AND CLIMB ON ONE ENGINE WITH A FULL LOAD—IT IS THE SAFEST AIRPLANE IN THE WORLD.

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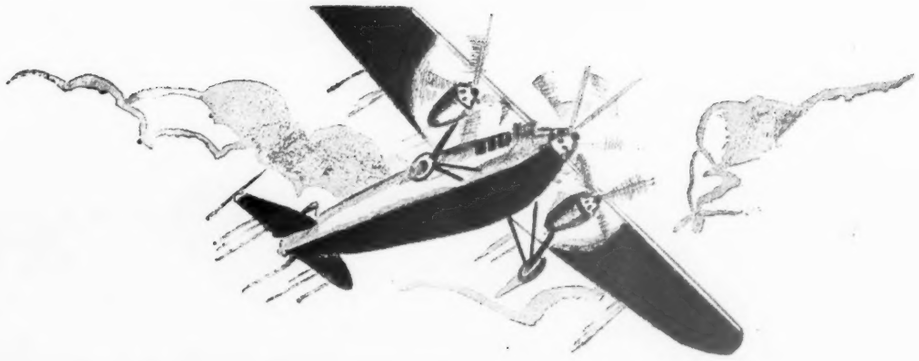

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the Better Spark Plug for every Aircraft Engine

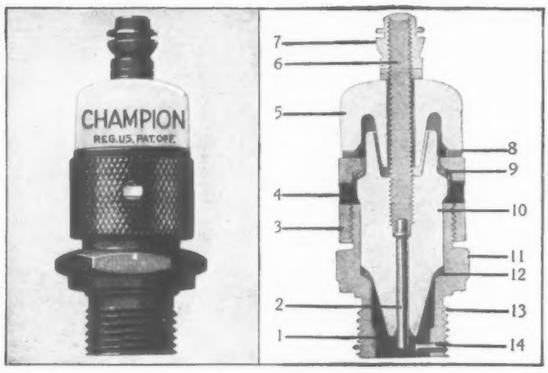
Long supreme wherever spark plugs are of vital importance, Champion has now given to the aircraft engine a revolutionary new spark plug, based on over two years of research, experiment and testing. Designed and built exclusively to aircraft specifications and needs, the new Champion Aero Spark Plugs daily bring a new factor of safety and dependability to an ever increasing number of aircraft engines.

Champion Aero Spark Plugs are so designed that it is practically impossible to break them in such a way as to interfere with engine operation. Their ability to withstand tremendous pressures and temperatures is combined with the ability to withstand a maximum amount of oil.

Sillimanite, nature's finest insulating material, which is exclusive to all Champions is used in both the primary insulator and the protecting "dome" insulator. Its superior strength and remarkable ability to withstand heat and electrical shock not only insures maximum safety against breakage at the terminal end, but also assures dependable ignition under all conditions at the firing end. These are special attributes of inherent design exclusive to Champion Aero types.

Although Champion Aero Spark Plugs are a departure from standard design, they retain all the exclusive features of Champion two-piece construction, new gas-tight copper gaskets and special analysis high compression electrodes.

Exceptional care and the finest workmanship insures in Champion Aero Spark Plugs the paramount requirements in aviation—safety and dependability. Install a set of Champion Aero Spark Plugs in your engine.



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13—Metric threads
14—Ground electrode

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Altitude—38,793 feet, December 21, 1927—Major Renato Donati.

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CHAMPION

TOLEDO, OHIO **SPARK PLUGS *for Aviation*** **WINDSOR, ONTARIO**

Man, how that Ryan *PERFORMS!*

Straight ahead, a row of trees. Beyond them, high tension wires. Who cares?

With a whirr like that of scared quail, the Ryan takes off in a short 275 feet, eight seconds of time.

Hold your stop watch and watch her climb. In one turn of the minute hand, an altitude of 1,200 feet.

Up and up goes the Ryan until a silvered speck disappears in the blue. A service ceiling of 18,000 feet, a top ceiling of 25,000 feet—marks for other cabin ships to shoot at.

Now she noses down, straightens out and flies as the crow flies. An easy cruising speed of 120 miles an hour, a top speed of 140. Space annihilated.

Because of what it does and is, Ryan is the ship for you.

Just as Lindbergh's Spirit of St. Louis was in a class by itself, so this Sister Ship outranks its field.

In ease of handling, stability and sureness of control, the master of every situation, the perfect servant of the man at the stick.

"Red" Harrigan at the factory, or any Ryan distributor will demonstrate these facts. We hope you're from Missouri, that's where Ryan lives.

On performance alone, Ryan built and sold in 1928 more Whirlwind cabin ships than any other maker.

Early deliveries of latest model, the new Ryan Brougham for Six, are now being booked. Write for illustrated catalogue. The Mahoney-Ryan Aircraft Corporation, Lambert-St. Louis Airport, Anglum, St. Louis County, Missouri.

The New RYAN Brougham—Sister Ship of the "Spirit of St. Louis"

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Naturaline functions just as uniformly in the North as it does in the South, *climate makes no difference.*

PITCAIRN AVIATION, INC.

Mr. James G. Ray of Pitcairn Aviation, Inc., wrote to us in appreciation of Naturaline, as follows:

"We have been using Naturaline on our New York-Atlanta Airmail line for several months and find it very satisfactory. We find that our motors run considerably smoother than they did on domestic aviation gasoline and that they develop about 25 to 50 more revolutions. Also our consumption is running less per hour—your distribution has made it possible for us to procure Naturaline at a very reasonable price."

Pilots flying these mail routes can always depend on securing Naturaline at these mail stations.

GULF AIRLINES, INC.

Mr. Wm. H. DeWald of the Gulf Air Lines wrote to us in appreciation of Naturaline, as follows:

"We have found that our motors run much smoother on Naturaline than on the regular domestic aviation grade of fuel and also that they run cooler which is a very important factor in this warm country. These features, coupled with the fact that it weighs one-half pound per gallon less than specification gasolines influenced us to adopt Naturaline for use on our lines and our experience with it to date has been very satisfactory from every standpoint."

Naturaline starts a cold motor quickly.

Naturaline is a perfectly balanced fuel.

Naturaline is uniform at all times.

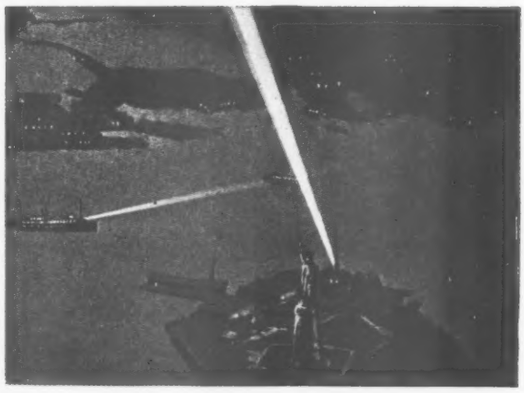
Naturaline weighs ½-lb. per gallon less than ordinary domestic aviation gasoline.

Naturaline will increase the R. P. M. from 25-50 depending upon type of motor.

Naturaline saves in fuel consumption from 5-15% depending upon type of motor.

Naturaline has an anti-knock value equivalent to 48% pure benzol.

Naturaline will reduce motor overhaul costs.



NATURALINE

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Company *of* America
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"Rank among the best"
writes Stinson Aircraft Corporation

"We have completed a series of tests on Sherwin-Williams Airplane Finishes. The Nitrate Wing Dope and Airplane Lacquer Enamel we have found to rank among the best we have found on the market today.

"Your Duraluminum Primer has also passed our tests for aircraft use.

"We feel confident in recommending these products to anyone desiring an excellent finish and a durable quality."

Very truly yours,
Stinson Aircraft Corporation
Ben. B. Jacobson, Supt.

Note the writer's words "*excellent finish*" and "*durable quality.*" Prominent manufacturers of aircraft have been quick to adopt the *complete line* of Sherwin-Williams Aero Finishes for these very reasons. The knowledge acquired in *sixty years* of making fine finishes—the best of scientific skill and research facilities—raw materials of finest quality—all these have been called upon to *perfect* these famous "quality" finishes.

The Sherwin-Williams line is complete—includes protective coatings, dope, varnishes and lacquer enamels. They insure maximum protection—are light in weight—offer the highest degree of beauty consistent with serviceability.

Increase visibility of planes

Important! Our skilled colorists will advise you on increasing the visibility of your planes by means of light-reflecting colors, contrasts, etc. Visibility is an important safety factor that pilots, owners and manufacturers must each consider. This service is gladly given. Write us for more details on these new, scientifically correct aero finishes.

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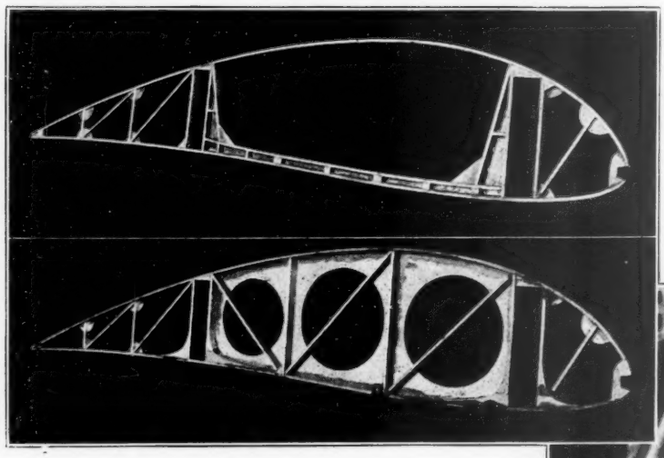
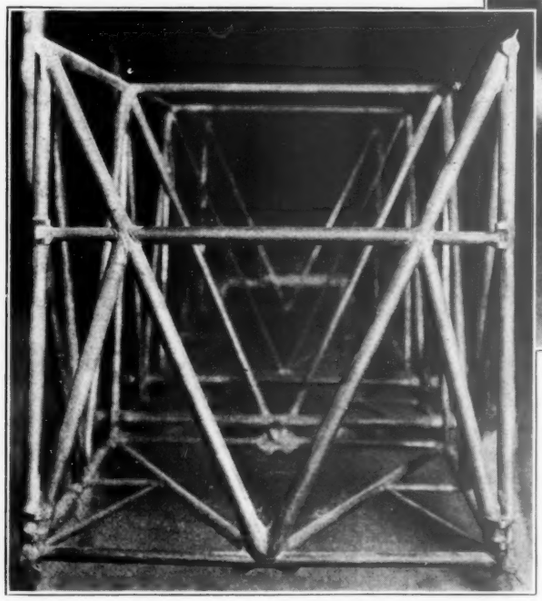


REFINEMENT OF DETAIL

WHEN flying becomes a business, good performance and an adequate factor of safety are not enough. Equipment must be capable of continuous operation with maximum reliability, minimum upkeep and with the least possible charges for depreciation, maintenance and repair. The consideration given these factors in the design of Knoll aircraft has been as thoughtful as the consideration given to performance. Makeshift construction has no place in the airplane which must operate at a profit.

The KN-1 is the product of an engineering staff of long experience and thorough training. It is built in a factory with every facility for quality production by an organization that believes the future of flying depends on machines which can be operated to show a profit.



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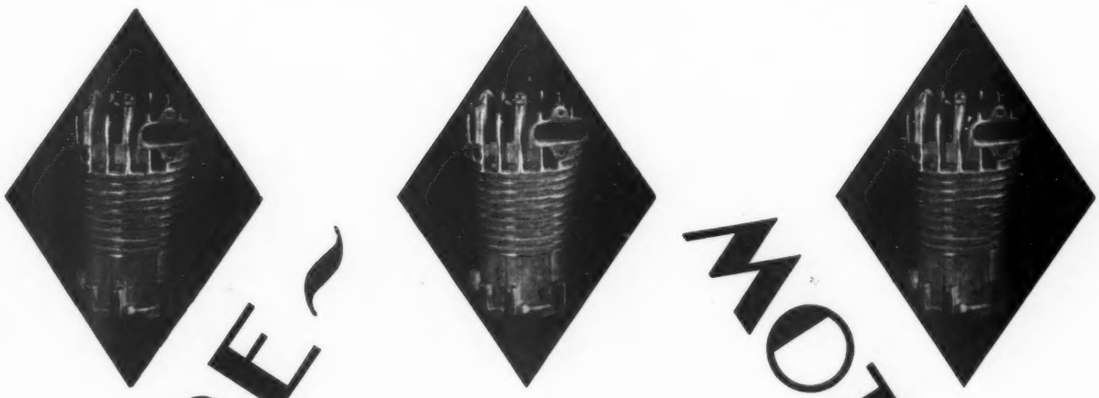


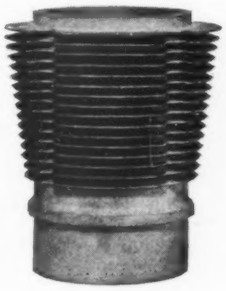
MORE~ MOTORS

more cylinders!

THE problem of to-day's aviation motor manufacturer has changed. A high number of motors are required by the many new planes now being made.

This is the production stage, and a great deal of thought on the proper handling of the various units going into such motors is of utmost importance. The present plant facilities of S. Cheney and Son plus their twenty-five years' experience in the manufacture of air-cooled cylinders are readily available to a motor manufacturer facing a production problem. Your inquiries will be given immediate consideration and definite plans for production following your specifications will be clearly outlined by a competent engineering staff.

WRIGHT **GYPSY**



The Wright Gipsy Cylinder is now manufactured under production methods and other outstanding motor manufacturers are using Cheney Cast Cylinders to good economic advantages. Cylinders can be furnished either rough or machined to the specifications of any responsible manufacturer.

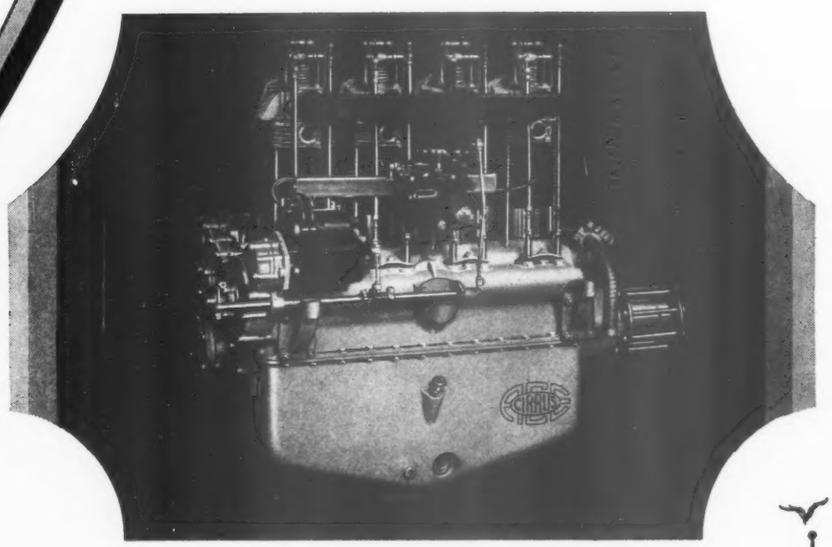
S. Cheney and Son

MANLIUS, N.Y.

THE AMERICAN CIRRUS MARK III

simplicity

the Key to Confidence



Three-quarter rear end view

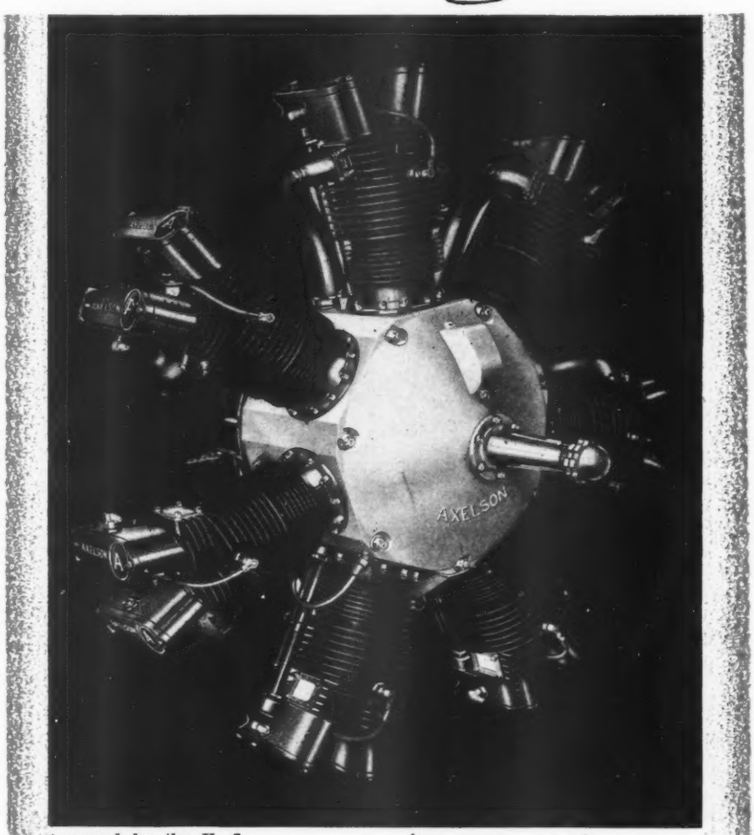
This crankshaft, is, without doubt, the most strongly constructed crankshaft in the world for a light aircraft engine.

EQUAL in importance with the extreme reliability of the American Cirrus Mark III is its simplicity of construction. Built to a well-known and conventional design, its operation is easily understood by a student or private flyer. The engine in its simplicity, creates a confidence in the pilot to control and maintain it as he has already controlled and maintained his automobile engine. This confidence is invaluable to any pilot, especially the amateur. It lends itself to top or complete overhaul with a minimum of cost and no further skill is needed for the care and maintenance of the engine than that required for the engine of a motor car.

AMERICAN CIRRUS ENGINES, INC.

WASHINGTON AVENUE, BELLEVILLE, N. J.

Engines *that reflect Accuracy in its highest* POWER



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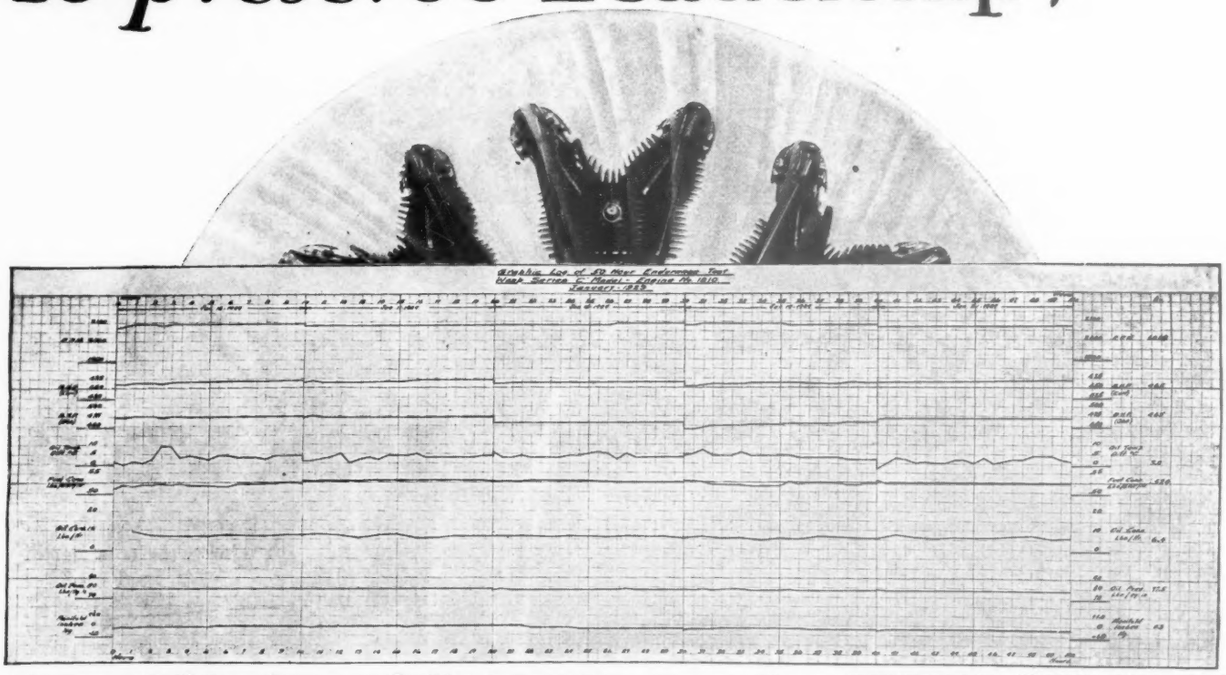

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Cable Address: "Machinist, N. Y."

NEW YORK Dist. Office, 285 Madison Ave.
WASHINGTON, National Press Building
CHICAGO, 520 N. Michigan Blvd.
PHILADELPHIA, 1600 Arch Street
CLEVELAND, Guardian Building
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SAN FRANCISCO, 883 Mission Street
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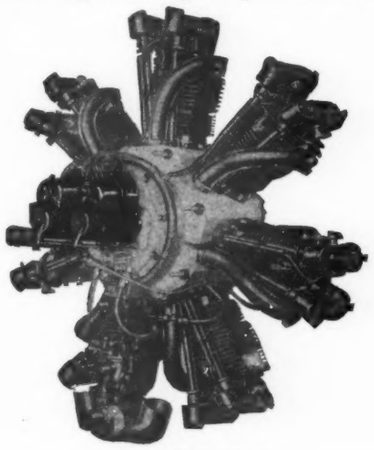

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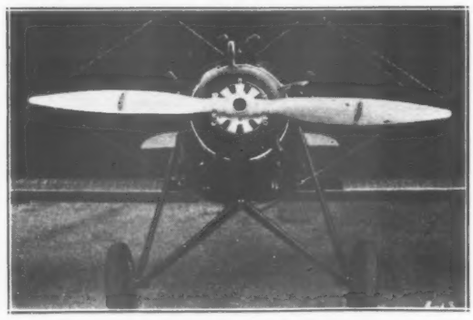

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May 11, 1929

VOLUME 26 . . . NUMBER 19

Useless Predictions

THE STATUS QUO of the aeronautical industry in the future is a subject which is becoming quite popular among "after dinner" speakers on aviation. As a matter of fact that is a very good subject, for one man's guess is just as good as another's. And guessing they are, particularly the newcomers into the field and the publicity hunting gentleman who ten years ago would have flown in an airplane only at the point of a gun.

Far be it from us to imply that the newcomers, such as bankers, investment brokers, and captains of other industries, etc., are not welcomed with open arms by the members of the original aeronautic industry. There is much need for their brains, their ability, and, of course, their money. They will prove of inestimable value to the development of aviation and the development of aviation will undoubtedly fully reward them.

However, five years ago the industry did not predict the era of 1927, and today, the industry cannot predict the era of 1935 or 1940. Instead, it is struggling toward a satisfactory solution of immediate problems, and planning what it can for tomorrow's task. This procedure, we believe to be far better and far more helpful than advising the world at large that the future aeronautic industry will be comparable to the automotive industry or the motor boat industry, etc. Perhaps it will be, and then again, perhaps it will be an industry all its own and one without a criterion.

//

Shoestring Developments

HOW MANY TIMES have we heard the statement, "I could put this airplane into production if I only had a few thousand dollars?" It would be difficult to count them, and each time we have felt that if the speaker did not get his few thousand dollars it might be better for the speaker, the airplane and the industry.

When prospective aircraft manufacturers, in estimating their financial requirements, assume that the cost of building one or two airplanes and equipping a small factory is sufficient, they are almost invariably courting ruin. Every successful airplane has been built up on a series of failures, and failures are expensive but necessary. And many promising designs have been shelved because of improper financing. This is also true of engine and airport enterprises.

If you have a good design and lack financial backing it would probably be better to sell it to someone who is in a position to produce it than to attempt it yourself. If you do attempt it, be sure to employ a financial "safety factor" sufficiently high to provide for the unforeseen failures which are inevitable.

//

Airport Restaurants

IN EUROPE, many persons amuse themselves on a Sunday by visiting an airport where they remain all day, watching the planes land and take-off. Comfortable seats under shade are provided for them, and, in many cases, luncheon is served. The airports have been made attractive, so that they have become gathering places. As a result, the European is becoming more and more airminded. The airplane, to him, will soon offer the only logical means of going from one place to another.

In the United States, a few of our air transport companies have endeavored to follow the example that has been set by Europe in making the airport attractive. They have erected passenger stations where the spectator may view the plane movements on the field in comfort, and they have provided restaurants where a real meal may be obtained. However at the majority of our airports, the spectator—the prospective passenger—has been entirely ignored. Most of the airports cannot even boast of a place to eat. True, there are "hot dog" stands, but nothing more. If the spectator wants a real lunch, he usually has to go miles to get it. Therefore, it would seem that airport operators, even if only for their own comfort, would see to it that adequate restaurant facilities are provided. In actual cash, the granting of a restaurant concession should bring the airport operator a return of from 40 to 60 per cent of the gross receipts.

CONSTRUCTING A Dustless AIRPORT

ONE OF the most interesting features concerning the Grand Central Air Terminal at Glendale, Calif., which was opened to the public early this year, is the success of the dust abatement methods employed there, particularly on the 300x1,500-ft. landing strip where a 6-in. depth of firm but resilient surfacing has been waterproofed and rendered dustless at a cost of about 7 cents per sq.ft.

The site for the field was chosen because it is only 15 min. by automobile from the Los Angeles City Hall and is situated in a wide, sheltered valley, where the winds are reported to blow in an up-valley direction 90 per cent of the time. Since most of the take-offs would be made, naturally, in one direction, the runway was located accordingly and was built of concrete 72 ft. wide and 3,000 ft. long, with provision for ultimate extension to 4,000 ft. The total runway width was brought up to 92 ft. by adding 10 ft. of 3-in. asphaltic paving on either side of the concrete.

The concrete is 6-in. thick at the edges and 5-in. at the center. It consists of a 1 : 2½ : 3½ mix, without reinforcing; has dummy transverse joints every 33 ft. and full expansion joints 100 ft. apart. The paving was laid in three 24-ft. strips poured alternately.

In addition to this main runway and connecting with its north end, there is a concrete paved taxiway extending along the east side of the airport, leading directly to the passenger terminal and widening out in front of the hangars beyond. The width of the taxiway from hangars to runway is extended by a 20-ft. width of 3-in. asphaltic concrete on either side. Twenty-foot taxiways of 3-in. asphaltic concrete are laid on the north and west sides.

An air view of the Grand Central Air Terminal, showing the concrete take-off runway and the landing strip, which parallels it

In order to conform to the requirements of the Department of Commerce for two take-off runways intersecting at an angle of not less than 50 deg., construction is to begin in the near future on the second concrete runway which will be 3,500 ft. long. The ground at the site had a general slope of about 6 in. per 100 ft. toward the Los Angeles River, and when construction of the airport was begun the first operation was to work over the surface with Fresnos until all low spots had been filled in and a smooth, uniform slope was secured so that surface water would run off readily toward the river.

For dust abatement over the field generally, a single application of a special grade of road oil having 60 to 70 per cent asphalt content was made under pressure and with oil at a temperature of 120 deg. F. About ½ gal. per sq.yd. was applied in this way, securing an average penetration of from ½ to 1 in. Before making the oil application it was found important to have the surface smooth and well compacted on a uniform grade.

Approximately 167,000 sq.yd. treated in this way has been found to remain dustless, although, where disturb-

How the Dust Problem Was Eliminated at the Grand Central Air Terminal, Glendale, Calif.

Working the soil of the landing strip with road graders to secure the desired admixture after the oiling and harrowing

ance of the surface is caused by out-of-place landings or by high speed taxiing, occasional light maintenance is required. It is expected that the entire area may require a repetition of this penetration oiling after a period of service of from perhaps six months to a year, according to the amount of rough usage.

In contrast to this light oil application for dust abatement, the landing strip, which parallels the concrete runway, was prepared with much more elaborate treatment to secure an area that would not be damaged even by the roughest landings. In this area, the objective was to get a firm but resilient waterproof layer of soil 6-in. thick. This depth is more than tail skids will penetrate, and thus rough usage will not make openings through which water can reach the subgrade.

A SOIL ANALYSIS showed the surface material to be an admixture of silt and sand of a very fine-grained texture. In fact, it was so fine, that to have applied oil without first working in coarser material would have resulted in a thin crust of soil and oil which would not have lasted long, because of the high percentage of silt and the absorbent quality of the very fine particles that are said to shorten the effective life of oil. This is just the opposite effect to that produced by admixture of oil and sand; the individual sand grains do not absorb oil, but, instead, are said to support and preserve its natural qualities.

Laboratory experiments were made with various quantities of sand in combination with samples of the silt, all based on the objective of a 6-in. layer of the admixed materials. A 3-in. layer of sand worked up with silt to give a 6-in. layer, resulted in a mixture such that 4 gal. of oil per sq.yd. was required to produce the plastic qualities desired. The maximum of efficiency and economy was found with a 4-in. depth of sand to which was added enough silt to bring the layer to a 6-in. thickness. This combination required only 3.2 gal. of oil per sq.yd.

Based on this determination, enough coarse, washed sand was dumped on the 300x1,500-ft. landing strip, so that when spread by Fresnos and smoothed off with a light drag it gave a uniform sand layer 4 in. deep. The entire area was then disked to a depth of 6 or 7 in., thus making furrows in the sand and cutting 2 to 3 in. into the silt. Finally the light drag was used over the entire area once more and the job was ready for oil.

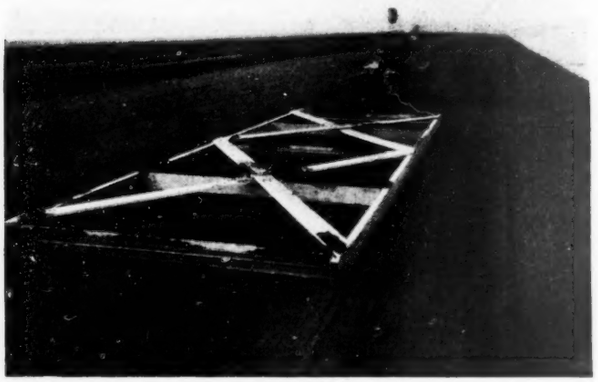
Disk harrowing the surface of the landing strip at the Grand Central Air Terminal after an application of oil

The oil used on the landing strip was a steam-distilled product of 60 to 70 per cent asphalt content, whose 80 penetration residium was not more than 80 per cent soluble in petroleum ether. This oil was applied from pressure trucks at temperatures of 300 deg. F. The oil was put on in five or six applications, and the entire area was disked after each application. It was found that the maximum amount of oil that could be absorbed to advantage in each application was about $\frac{3}{4}$ gal. per sq.yd.

The full amount of oil prescribed was put on with only the disk harrowing between successive applications. No drags were used in this operation. After the oil applications had been completed, the surface was worked repeatedly with road graders so as thoroughly

to mix the oil with the sand and silt. These graders had 12-ft. blades. Three or four of them were used almost continuously, and it was found that from 40 to 50 trips were required over every part of the surface to secure the desired admixture.

The bladers worked the full 1,500-ft. length in 25-ft. strips. The material was first scraped to one side of the 25-ft. strip, where it was piled in a windrow, and then a series of successive trips moved it back to a windrow on the opposite side of the strip. This blading



Smoothing the landing strip with one of the light 8x24 ft. timber drags hauled by a 2-ton tractor

from one side to the other was repeated until the oiled material was uniformly black, indicating an even distribution of the oil.

After the graders had finished, the area was smoothed off to a uniform 6-in. thickness by the use of light 8x24 ft. timber drags drawn by 2-ton tractors. Great care was taken in this dragging to get the slope uniform. As a final operation, an 8-ton tandem roller went over the entire area once, thus giving a finished surface not too solidly compacted. Tests were made with a 12-ton roller, but this weight produced an undesirable solidity.

Due to the necessity for completing the landing strip prior to the date that had been announced for the airport opening, enough equipment was concentrated on the job so that the entire oiling and working of the 300x1,500-ft. area was completed in 12 days. The cost of the labor and materials used in constructing the landing strip, as estimated on the basis of laboratory tests, was to be as follows:

	Per Sq. Ft
Four-inch sand layer	$0.013
Special oil @ 3.2 gal. per sq.yd.	0.028
Mixing and finishing	0.005
Total	$0.046

This estimate was low, however, and the total costs, when the work was finished amounted to about 7 cents per sq.ft.

Colonel Lindbergh, as consultant for one of the air transport companies that has leased space at the airport,

One of the pressure trucks applying the oil to the landing strip at the Glendale port

has pronounced the landing strip the finest of its kind that he has seen. It yields readily, thus decreasing rebound in rough landings and its depth and structure insure permanent water tightness. The 0.5 per cent slope is sufficient to carry off the surface water rapidly enough to prevent emulsification of the oil, and, finally, there is no dust to be stirred up by landings and take-offs. The company that supplied the oil has guaranteed the area against dust for a period of one year.

The Grand Central Air Terminal was financed and developed by Capt. C. C. Spicer and C. A. Spicer of Los Angeles. The latter is a member of the Associated General Contractors and had charge of all construction as general contractor. L. D. Fish, research engineer for the Gilmore Oil Company, prescribed the grades of oil to be used and co-operated with Mr. Spicer in developing the methods of constructing the landing strip.

Results of the Examination of Soil at the Airport Before Treatment

Sieve Analysis:	Per Cent
Passing 200 mesh	33.0
Passing 100 mesh and retained on 200 mesh	19.5
Passing 80 mesh and retained on 100 mesh	8.5
Passing 56 mesh and retained on 80 mesh	11.1
Passing 40 mesh and retained on 50 mesh	9.2
Passing 30 mesh and retained on 40 mesh	6.6
Passing 20 mesh and retained on 30 mesh	5.8
Passing 10 mesh and retained on 20 mesh	4.1
Passing ¼" ring and retained on 10 mesh	2.2
Total soil	100.0

Separation and Classification:	Per Cent
Clay	7.6
Silt	25.4
Sand	64.8
Rock	2.2
Total soil	100.0

Determination of Sulphates:	Per Cent
Calcium sulphate, $CaSO_4$	0.001
Sodium sulphate, Na_2SO_4	Absent

Specifications for Sand Used in Landing Strip:

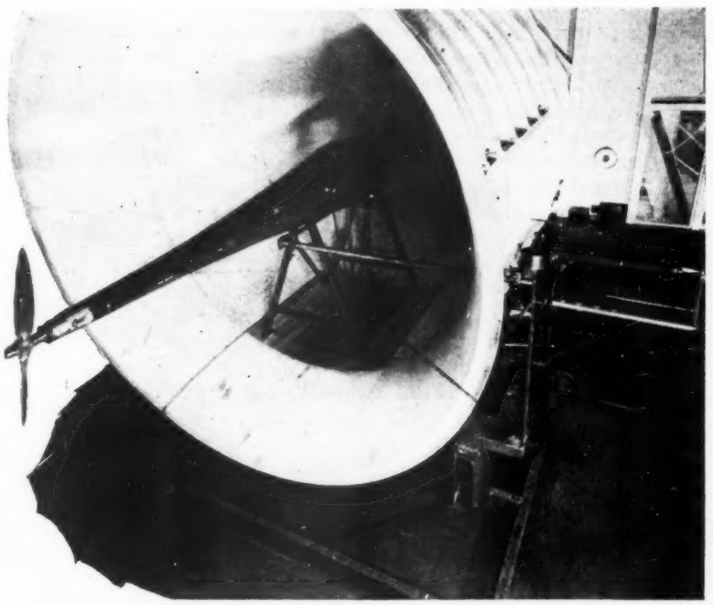
Sieves:	Per Cent
200	0 to 5
100	0 to 5
80	0 to 5
50	5 to 15
40	5 to 15
30	8 to 16
20	15 to 30
10	15 to 30
1¼	15 to 30

THE GUGGENHEIM AERONAUTIC LABORATORY AT Stanford University

By Elliott G. Reid
Professor of Aerodynamics
Guggenheim Aeronautic Laboratory, Stanford University

THE DANIEL GUGGENHEIM Aeronautic Laboratory at Stanford University was completed in 1927. It is housed in a building measuring 50x200 ft., which had previously been used for engineering shops. Approximately one-half of this building is now one large room containing the wind tunnel, while in the other end there are class rooms, a library, drawing room, work shop, offices, and storage rooms. The tunnel room occupies the full height of the building; an unfinished second floor space above the offices, etc., serves as a storage room. In this space are housed a fully assembled pursuit airplane, propellers and aerodynamic models, and much miscellaneous equipment.

The wind tunnel is of the open circuit, circular section, Eiffel type and has a throat diameter of 8 ft. Its overall length is 68 ft. The only honeycomb used has 1-in. hexagonal cells 5 in. deep; it is located at the downstream end of the contracting portion of the entrance cone, i.e., about 4 ft. from the upstream limit of the free jet. The Eiffel chamber is 18x20 ft. in plan form and 13 ft. high. This is surmounted by a connected balance chamber, which is 10x11 ft. and measures 7 ft. in height. The tunnel fan, which is located at approximately 15 ft. from the end of the exit cone, has eight blades and is 12 ft. in diameter. It is driven through a wide leather belt by a 100-hp. d.c. shunt motor which makes possible a maximum wind speed of about 90 m.p.h. without exceeding the normal overload rating of the motor, which is 125 hp. Electrical energy for the main driving motor and for the propeller testing apparatus is supplied by a synchronous motor-generator set located in the laboratory, which in turn receives its power supply from 4,000-volt commercial power lines. All direct current excitation is supplied by a second small motor-generator set, also situated in the laboratory.



The propeller dynamometer in place for a test in the wind tunnel of the Guggenheim Aeronautic Laboratory at Stanford University. The dynamometer is mounted on a movable carriage which can be moved into or out of the wind stream

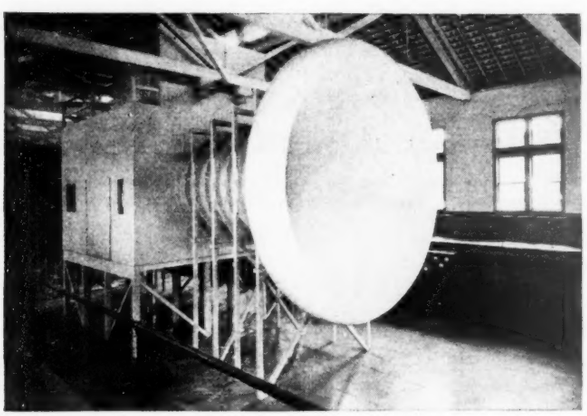
The aerodynamic balance is located in the small chamber immediately above the main Eiffel chamber. The balance room is completely floored with the exception of a trap door and small openings for wires in order to preserve the symmetry of the Eiffel chamber with respect to the air jet. The balance is of the six-component wire suspension type, but departs in several important details from previous practice. Six fully automatic, electrically operated balance beams rest upon a cast-iron bedplate, which is in turn supported upon "I" beams that hang from the roof trusses of the building. A rigid sub-frame, supported by three balance beams, hangs just clear of the floor of the balance room. The model under test is supported from this frame by any suitable form of wire suspension, a counterweight

Through the courtesy of Professor Reid this article is published to correct a misleading article on the Guggenheim Aeronautic Laboratory at Stanford University that appeared in AVIATION, *March 9, 1928....*Ed.

being added when necessary to maintain tension in the wires under the action of air forces on the model. The frame is restrained from downstream movement by flexible links, attached to either side of the frame, which, through bell cranks, transmit the restraining forces to two other balance beams. The sum of the forces acting on these beams is, of course, equal to the drag, while the difference between them times the distance between the links is equal to the yawing moment. The total lift is measured by the sum of the forces on the three beams supporting the frame, while the pitching moment is obtained by a combination of lift and drag forces. As the rear lift balance lies over the fore-and-aft center line of the tunnel, and frame and the forward pair are displaced laterally from the center line, the rolling moment is calculable from a knowledge of the distance between the forward points of support and the forces on the two forward lift balances. The frame is restrained from transverse motion by a single link and bell crank communicating with the sixth beam which indicates the cross wind force directly. Counterweights are used to apply initial tensions to the drag and cross wind force systems.

With this type of balance, it is necessary for the calculation of moments to have accurate knowledge of the position of the model with respect to the balance table. For this purpose, a special telescope, equipped with a carriage and scales for vertical and horizontal motion (the latter along the stream direction), is mounted alongside the tunnel throat on a concrete pedestal, which rests upon the building floor. The cross hairs in the telescope are brought into register with a mark on the model for the reading of position. The telescope also is capable of rotating about its optical axis and is provided with a graduated circle for the measurement of angles. The matching of one of the cross hairs with a line on the model thus serves to define the angle of pitch.

The propeller testing apparatus consists of a combined torque and thrust dynamometer mounted upon a movable carriage, which can, by removal of a portion of



A general view of the open circuit, Eiffel type wind tunnel at Stanford University

the exit cone collector, be moved into or out of the wind stream. The dynamometer itself is of the electric cradle type, but is mounted on elastic knife edges rather than in the usual ball bearings. As these knife edges are necessarily below the shaft, a pendulum counterweight is required to bring the center of gravity of the assembly below the line of knife edges. The dynamometer actually consists of a special shunt-wound direct-current motor upon one end of which has been built a long cast aluminum housing, enclosing the propeller shaft. A special coupling fitted to the motor shaft makes it possible to transmit torque to the collinear propeller shaft, which is free to float axially. The torque required to drive a model propeller is measured by exactly the same method that is used in the testing of an engine on an electric dynamometer, i.e., by restraining the rotation of the dynamometer shell by a simple beam balance. The thrust of the propeller is measured by another balance, which is connected by a linkage to a ball bearing cage riding on the floating propeller shaft, thus restraining its axial motion under the action of the thrust. The thrust balance is damped by a vane and dashpot at the end of the balance beam; torque damping is provided by a similar combination at the lower end of the counterweight pendulum.

FOR THE DETERMINATION of propeller characteristics, the necessary data are thrust, torque, air speed and density, and propeller speed. Thrust and torque are measured directly as described above. Air speed is calculated from knowledge of the pressure reduction in the Eiffel chamber and the air density. To fix the latter, humidity and barometric pressure are required. The propeller speed is obtained through the use of a two-pen chronograph. One pen is actuated by a clock pendulum, while the other receives an impulse at each fiftieth revolution of the test propeller. This impulse is provided by a single segment commutator connected by a worm to the dynamometer shaft.

The measurement of balance room pressure reduction, used for the determination of air speed, is accomplished through the use of a balance from the beams of which hang two inverted bell jars, whose open ends dip beneath the surface of a tank of kerosene. Vertical tubes lead to the entrapped air volume within each bell jar; one tube is open to the Eiffel chamber and the other passes through the chamber wall to the main tunnel room. The difference in pressure measured by this balance is somewhat greater than the dynamic pressure of the wind stream, because a certain amount of the total pressure energy is expended in overcoming a wall friction. It has been determined, however, that this pressure reduction bears a constant ratio to the dynamic pressure, unless the air stream is obstructed by some very large object. Under this condition, the reduction of pressure at a certain point of the intake cone is used as an index of the air speed.

The velocity of the air stream is sufficiently constant without any form of speed regulation other than that provided by the independent power supply for propeller testing and model testing of the usual kind. The regulation is not sufficiently close, however, for quantitative experiments on stationary models in which the highest degree of experimental accuracy is necessary, and for this purpose a special form of regulator is being developed.

It may be of some interest to those concerned with aerodynamic research to learn the relatively small cost of the equipment described above. In the present laboratory, after the wind tunnel room had been prepared for the interior structure which it was to receive, the cost of the apparatus placed therein, including tunnel structure, honeycomb, propeller, shafting, drive motor, motor-generator sets, aerodynamic balance, propeller dynamometer, etc., actually totals less than $15,000.

Engineering SECTION OF THE *AERONAUTICS* BRANCH

By DONALD E. KEYHOE

AS INDICATED by the preceding article. regulation is the most important work of the Aeronautics Branch of the Department of Commerce, although it receives only a small percentage of the entire appropriation for the Branch. Most of the money goes to the Airways Division, which operates through the Bureau of Lighthouses, but is under immediate direction of the Assistant Secretary for Aeronautics, and the Director. At first thought, the Airways Division might be considered the most important unit, but such is not the case.

Maj. Clarence M. Young, director of Aeronautics, recently made a statement bearing on this, although not in any discussion of the relative importance of the divisions.

"One-tenth of civil flying is on schedule over the airways," he said. "The rest is miscellaneous flying, including sightseeing, taxi work, student training, advertising, crop dusting, and a score of other operations along with private flight. The airway is of great importance to that one-tenth, and to a less degree to the rest of the industry, as air transport has been the backbone of commercial aviation. But without licensed pilots and licensed planes to fly over them, the airways would be of no value.

"They might have the utmost in beacons, intermediate fields, radio aids, weather observing stations, communication service, and every other facility, but without airworthy aircraft and competent pilots flying in conformity with standard air traffic rules, there would be chaos. To protect airway operators—the one-tenth—from possible danger from *part* of the other 90 per cent, regulations are vital."

So the Regulation Division comes first in the Aeronautics Branch, and is considered first by the industry, even though the Airways Division gets the lion's share of the appropriation to cover expensive beacons, preparation and upkeep of fields, and installation and maintenance of radio aids and communications.

The Regulation Division was organized late in 1926 by Director Young—then chief of that division. There were absolutely no precedents to follow. The Air Commerce Regulations were written after careful consideration of the needs, and co-operation with those to be governed. The Division is now headed by Edward Howard, who is a major in the Air Corps Reserve and an authority on commercial work. The unit comprises these sections: Engineering, Licensing, Inspection, Medical, Statistical, and the Aircraft Accident Board.

After two years of operation, it might be expected that this division should be settled into regular, routine operation, and that any and all problems could be solved by ready reference to various cases, decisions, and so forth. But here is what has really happened:

At the start both Assistant Secretary MacCracken and Major Young said emphatically: "No parlor aviators." The best pilots obtainable were secured for inspectors. The field was scoured for capable engineers, of which there was already a shortage. Even on "desk jobs" not requiring piloting experience, men with flight training began to appear. Their knowledge helped. The total result was teamwork of a fine order. The outfit was new; it liked the game. It rolled up its sleeves and enthusiastically started to work.

BUT hardly had it begun when the industry awoke to the value of these men, particularly the veteran pilots and engineers. It waited until they had acquired a good understanding of the Department's ideas and policies—and then sang its siren song. And who could blame pilots or engineers for accepting attractive offers that came from "the outside"?

The Department did not make any attempt to hold them against their will; not one man has ever been requested to stay when he strongly desired to leave. Chiefs of divisions and sections have simply sighed and started looking for replacements, knowing the same thing would happen all over again.

The turnover has been tremendous in the past two years. Nor will the situation be any better for some time. The effect has been and still is unfortunate. The few individuals who have remained as heads of units—usually against the lure of fine offers—find themselves in an annoying position. A case comes up, something which in most Government offices would be turned over to "Old Trusty," who has handled just such cases for years. But the Chief of the Regulation Division, for instance, cannot push a button and dispose of the matter so easily, for the simple reason that the "old trusties" are few and far between. Just about the time a subordinate has been trained enough to take over minor details and perhaps a few of more importance, he resigns to take a lucrative position with the A—— Manufacturing Co., or with the B—— Transport Co.

So the keys to the fast-changing, complex picture are

held by less than six men in the Department of Commerce.

These "less than six" must carry in their heads the answers to a thousand and one minor questions, instead of being free to concentrate on major problems. All this added to the breaking in of new men at too-frequent intervals.

Perhaps in the future the keen, restless, active type now directing the Department's aeronautical work will be replaced by more phlegmatic, methodical officials who will painstakingly consult Page 96, Volume II of "Decisions and Cases," or some other guide covering any and all situations that may occur. It will not be for some time, because those now making the decisions haven't enough time to get them compiled nor personnel to do the compiling. And a careful search will fail to disclose any phlegmatic officials at this time.

The "turnover" situation, resulting in only a few men being left with sufficient experience to make important decisions, has been and is responsible for much of the criticism from the industry. Sometimes, oddly, it is the company that takes a man from the Department that complains because certain work is held up—when it is a result of that very man being taken away!

Most of the industry's criticism has been directed at the Engineering Section. This is only natural, because that section controls the first step in the licensing of airplanes.

W. P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics

A CORPORATION decides to build an airplane. It secures financial backing, builds or leases a factory, engages engineers and plans its product. Sometimes it builds the first plane—before it comes to the Department of Commerce to learn whether its plane will meet licensing requirements. A few manufacturers have even started production at the same time that they submitted their stress analyses, drawings and other necessary papers to the Engineering Section, apparently expecting approved-type certificates in the next mail.

Now there are about 170 listed airplane manufacturers in the United States. Some of these are manufacturers in name only, but the many large companies make up for them. It is safe to assume an average of at least two engineers per airplane manufacturer, because of the large number in the bigger organizations. That means at least 340, and probably over 500 engineers who are frequently in correspondence with the Engineering Section about new designs, changes, safety equipment or other matters.

Then there are engine manufacturers, and builders of propellers, safety equipment, and accessories, some of which are to be certified by the Department.

Conservatively, there are about one hundred cases constantly before the six engineers who make up the Engineering Section. And every one of the manufacturers or engineers behind those hundred cases insists on speed, pointing frantically to delayed production, overhead from idle factories, and serious financial losses.

Six against three hundred and forty. The ratio should be enlightening. Not that the Engineering Section is ever "against" any one, or any corporation, in spite of many complaints from the industry. More of that later.

The small force to handle the volume of business is only one factor. At the outset, in order not to hold up production of planes or otherwise hamper the industry, the most simple engineering code was adopted by the Department. Those in charge believed that the manufacturers were sincere, as a rule, and that they would naturally use good practices and keep safety in the foreground, in order to gain the best possible reputations and impress the public with the dependability of their products.

At that time there were few manufacturers who would not have subscribed to this theory. But when the boom came it became merely a theory, for it was inevitable that shysters should appear in this newest field for making money quickly. The "honor system" didn't work at all with them. The first simple code had left numerous loopholes on points where the Department believed manufacturers would use accepted methods of construction and correct material. The shysters seized on every point where money was to be saved, even though that money saving meant unsafe planes.

"The regulations don't cover these matters," they retorted when questioned by the Engineering Section. "We can do what we please."

The immediate result was a let-down in quality of some products, fortunately in the minority but sufficient to cause a few disasters and thereby lower public confidence. The Department was forced to revise the code, and it is still revising it from time to time, in order to keep the unscrupulous manufacturer from getting "inside the law" with a dangerous plane.

The code is too large, but not of the Department's choosing. It causes the Engineering Section as much trouble as it does the industry, for it takes more time to check minor points which should be assured by good practice. And it keeps at least one engineer busy working on changes to keep up with the eager seekers for loopholes.

The burden of making commercial airplanes safe has been squarely placed on the Department of Commerce. Of course, there are builders who would not consider inferior material or questionable methods for a moment. But the percentage of planes in which serious flaws have been found is surprisingly large. Even a few of the older manufacturers have tried to "get by," and this has been the general rule with the get-rich-quick type. This same tendency has been found in flight testing. At first, the Engineering Section carried out only ordinary tests, until a series of crashes to certain types of planes forced investigations. Now all new designs are "given the works." The tests are as strict as those given planes proposed for Army and Navy use, although naturally they are not expected to have similar performances.

These flight tests have disclosed some strange conditions —planes that stall at critical points where they should be inherently stable, that are tricky, that get into spins easily—and stay there! That is, until they hit the ground.

A Department with a hard-boiled attitude would never have given these planes a chance to reach the market. It would have grounded them at once, broadcast the damning report "Unairworthy" throughout the industry, and several manufacturers today enjoying comfortable incomes would have been ruined almost overnight. Not that the Department has permitted such conditions to continue, for that would have been criminal negligence. But its policy has been admirably fair and lenient.

From Assistant Secretary MacCracken, Director Young, and on down through the Regulations Division to every engineer and inspector, the order has been the same:

"If you find something wrong with a plane, tell the manufacturer what it is, and keep quiet about it. Help him as much as you can without stepping on the toes of the private consulting engineers. But keep quiet."

As an example of this, here is a situation that occurred. A certain airplane was found to be downright dangerous. It was weak, unstable, and in a short time would have been publicly classed as a menace if permitted to get into the hands of pilots who did not realize this condition. It was selling in large numbers, too. The Department was worried, for the manufacturer did not appreciate the weakness of his plane, and he did not show much desire to co-operate. Yet it did not wish to put him out of business. Time was precious; the Engineering Section put one of its experts on the job, had every defect located and a proper remedy prescribed. The manufacturer, at first resentful, suddenly realized that he had had a close escape from disaster.

THIS was an exceptional case. The Department cannot redesign airplanes, even if it had enough men to do the work. That is the field of the private engineer. But that was in the topsy-turvy days when rules occasionally had to be suspended for the good of the industry. The result in that instance justified the means. That plane is no longer a menace. It enjoys popularity and a good name among those who fly it. It is making money for its builder. Yet one single "whisper" by a Department representative might easily have put that company on the rocks. For the airplane is not like an automobile. Thousands of people deride the "flivver" car but they are not afraid to ride in it. But nothing in the world would get a man into a plane with a reputation for collapsing wings, permanent spinning proclivities, and other unpleasant maneuvers of that sort.

This is only one of many cases that could be given to show that the Engineering Section is trying to help, rather than hinder the industry. It has never turned down a request for an approved type certificate without a full explanation, and an indication of the faults. When the faults have been corrected the Section takes the request as a new case, forgetting the former errors, even though they may have plainly shown an attempt to "get by."

Other elements enter into the matter of getting planes approved. Some engineers in the industry forget to comply with the standard procedure in submitting drawings and data. Not infrequently the information sent in is in such a muddled condition that the Department has to ask for detailed explanations, or even have the engineers come in and point out what they mean. This increases the time for handling the case by several hundred per cent.

Even when the information and drawings are in excellent shape, it takes considerable time to check the important computations and inspect the drawings to see that good engineering practice and Department requirements have been followed. There is always a stack of blueprints awaiting action in the Engineering Section—while the handful of engineers wade through others ahead of them on the list. Almost the full time of one man of the six is taken in answering impatient queries as to the delay in certificates, or related matters. And there are inevitable interruptions from visitors, routine, and miscellaneous correspondence.

The full time of not more than four engineers is available for consideration of stress analyses and design data. The rule in the Section is: "Do all you can to complete cases quickly—but don't skip through. Don't take anything for granted."

THE EFFECT of one big mistake would be extremely serious. In spite of its criticisms, the industry relies on the standards of the Engineering Section for safety. Perhaps some builders have codes of their own that are even higher—but they are certainly interested in knowing that other planes operating on airways and at airports close to their own planes have been built to eliminate hazards and keep up public confidence. The airplane buyer and the air traveler have been educated to look for the A.T.C. insignia, and the license number. The first time—if ever—that a grave defect in an approved type plane is found to have caused a big crash, the belief in Department of Commerce standards will suffer a great decrease. And what other standards are known at the present time?

The effect would be regrettable not only in the United States, but in regard to foreign markets, for the basis of foreign sales is the guarantee of airworthiness by the Department.

The Engineering Section cannot afford to make any such mistake. So it remains careful—and care doesn't go hand in hand with haste. The only solution is *more engineers.* But try to get them!

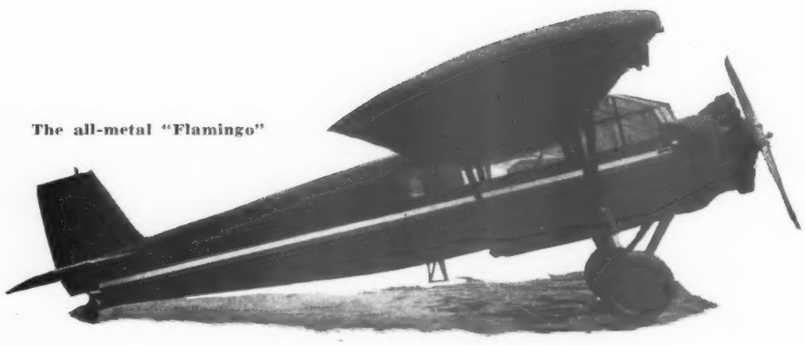
Some have complained that the Department's engineers are far too theoretical, that sometimes mathematically they are right, but practically wrong. This would resolve itself into a battle between engineers before it could be settled, but this writer has one answer to make. While connected with the Department I learned of several planes which the Engineering Section believed "questionable." I had until then considered both types satisfactory.

Shortly afterward I had an opportunity to fly in one of these planes. It looked sturdy, reliable, and it was an attractive plane. But I refrained. A little later that same plane went into a beautiful spin, and remained there until it was interrupted by sudden contact with the ground. Others of that same make have gone through similar dubious performances—resulting in fatalities.

From now on the judgment of the Engineering Section is sufficient for me. A crash is a crash—theory or no theory!

This is the second of a series of articles prepared by Mr. Keyhoe dealing with the Aeronautics Branch, Department of Commerce. The third will appear in an early issue.—Ed.

PLANES THAT *Fly* OR



The all-metal "Flamingo"

IT IS a common failing to overemphasize the importance of one's particular line of business activity in relation to the general business world—and likewise, one's individual interest in a given business in relation to the business itself. Yet, if I were asked to name that branch of the aviation industry which is most important and far-reaching in its effects on the ultimate success of aerial transportation, I should say, and I believe without exaggeration, that it is the manufacturing, with its accompanying problems of engineering and commercial research.

If commercial aviation is to endure and prosper it must be profitable. In making aviation profitable the manufacturer plays probably the most important rôle of all. Why? The whole answer lies in this fact—there is a vast difference between the building of planes which will fly and the building of planes which will show an attractive operating income as commercial carriers. Let us examine briefly the manufacturer's position.

Scarcely a day passes without the announcement of the formation of a new airline. Mergers and syndicates representing millions and hundreds of millions of dollars are coming quickly into existence. Individual investors and finance houses are seizing upon every opportunity to join the horde of searchers of the new "golden fleece"—to become part owners of the treasure-laden argosies of the air. It is a veritable hey-day of the skies.

Aerial view of the plant of Metal Aircraft Corporation, Cincinnati, O., manufacturer of the all-metal Flamingo. A portion of Lunken Airport is to be seen in the foreground

However, the very novelty of the industry, itself, suggests its speculative nature. As in other lines of investment which are new, intensely interesting and speculative, stockholders will be content to pass the first several dividend periods without a definitely favorable showing of earnings. They will agree to expenditures which are possibly not as conservative as they should be. They will listen to recommendations which later will prove to be unsound. All this they will do for a time as a tribute to romance, and for lack of established precedent in the industry itself.

BUT SOONER OR LATER there will be a day of reckoning—a day when dollars and dividends will be the only satisfying answer at stockholders' and directors' meetings. It is this day that the manufacturer must constanty anticipate, and if he conscientiously expands his activities beyond those of simply manufacturing—of simply assembling wings, fuselages and engines—this day may be averted. I said before that there is a vast difference between planes which will fly and planes which will earn in transport duty. A plane may be perfect from purely an engineering standpoint, yet highly impractical from an operating viewpoint. It is the correlation of the engineer's design with the public's requirements of actual operation which determines the successful plane. In order to realize this correlation it is necessary to call into action practically the entire production and selling organizations, together with the design staff and a special department for commercial transport research. The selling organization brings in the public's present problems. The department for commercial transport research analyzes the public's future problems. The production department modifies design so as to permit economies in methods of fabrication. The design staff translates the public's requirements of the present and future along with produc-

PLANES THAT Earn?

A Manufacturer of All-Metal Planes Expresses Opinions Regarding Airplane Construction

By THOMAS E. HALPIN
Vice President and General Manager
Metal Aircraft Corporation of Cincinnati

Thomas E. Halpin

tion modifications, into a design which will operate efficiently today, and which tomorrow will not suffer from obsolescence. It will be of interest to see how this plan functions in the manufacture of our "Flamingo."

Take for example our selection of structural materials. Purely temporary consideration would probably dictate the use of wood and fabric as offering wider profit margins for the manufacturer. Wood is cheaper to stock and lessens the manufacturer's investment which is tied up until production is sold. But when wood is suggested as a structural material there is a storm of criticism and protest from all five of our counsellors: the Design Staff, the production department, the selling organization, the Department for Commercial Transport Research, and most of all from the public.

The Design Staff points out that the loading, fatigue and joining strength of wood cannot be gaged with the accuracy and certainty that is possible with metal.

The production department cites that metal can be given almost any form in fabrication, while the working of wood suffers distinct limitations.

The selling organization complains that wood and linen structure offers no selling advantages.

The Department for Commercial Transport Research emphasizes the uncertainty and short life of wood, and stresses the fact that the trend in all engineering structures is very definitely toward metal.

The public—who, after all, deserves the greatest consideration because its investment is at stake—speaks primarily in terms of its investment. It urges metal structure because of the very low rate of depreciation, the low maintenance, the ease of inspection and serviceability—but, above all, because metal attracts revenue patronage with its decrease of the fire-hazard and its generally increased safety factor.

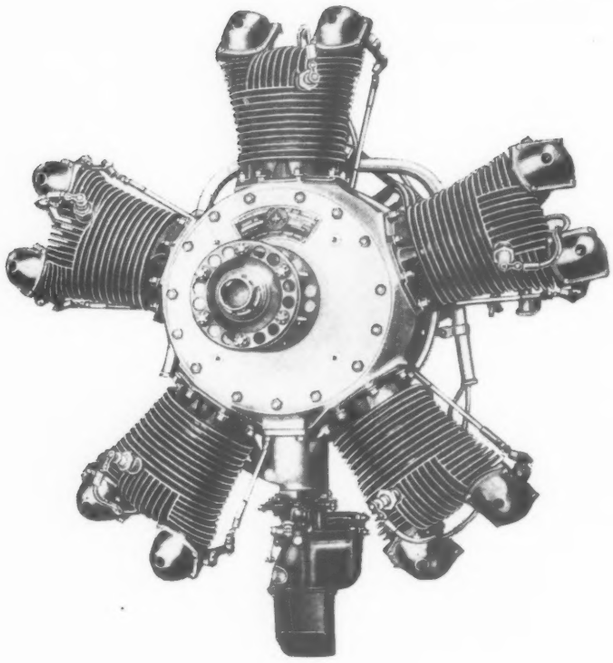
OF EQUAL IMPORTANCE and vital concern to the public investment in airlines is the question of the capacity and speed of transport planes. As the industry grows, as competition intensifies, there will be radical, over-night changes in the sources of revenue producing traffic. Airlines which will have equipped themselves with one type and capacity of plane in anticipation of a steady flow of a given class of traffic, will suddenly find themselves bereft of that class of traffic, for reasons of competition or for other unforeseen changes. Such disappointing changes and suddenly reversed conditions are characteristic of even the most stable and well-organized transportation media.

It is obvious, then, that the manufacturer must design, in so far as possible, utility equipment which can be readily switched from one class of service to an entirely different class when occasion demands, without loss of time or excessive cost to the transport operator. We feel that we have achieved this end in the capacity and speed of the Flamingo, which has been built to accommodate both mail and passengers; a plane which can be operated effectively in express service exclusively; a plane which is not too large to press into service as a sight-seeing unit during odd hours at terminals; a plane with more than the necessary speed and economy in taxi or tour traffic; and a plane possessing the reserve power and service ceiling requisite for the efficient dispatch of profit-paying loads over all kinds of terrain.

DESIGNING PLANES that will not become obsolete in the course of a few years is the problem assigned to our department for commercial transport research. Its task is that of pulling back the veil of the future—studying and plotting geographically the sources and classes of future air traffic—recording conditions of weather and terrain along new airlines—considering the speed requirements of the future—competition with existing methods of transportation—analyzing the volume and varying rate of traffic flow—all so that planes may be built now, today, which will function profitably tomorrow.

When one regards the unprecedented growth of the infant industry of transportation, its multitude of problems and perplexities, its treasuries overflowing with public investment, which must be safe-guarded and which must soon show definite earnings, one realizes more keenly the grave trust that is vested in the manufacturers of aircraft. Theirs is the privilege to shape the successful destiny of aerial travel. And, in conclusion, if I may be permitted to repeat, their greatest problem is to build transport planes that will earn—not simply planes that will fly.

THE *LeBlond Sixty* (MODEL 5-D)



THE LeBlond Sixty Engine, Model 5-D, which is now being manufactured under Approved Type Certificate No. 12 by the LeBlond Aircraft Engine Corp., Cincinnati, O., is a five-cylinder static radial air-cooled type having a manufacturers rating of 60 hp. at 1,900 r.p.m. and an approved rating of 65 hp. at 1,950 r.p.m. Approval followed a fifty-hour endurance test conducted by the Navy Department at the Aero Engine Laboratory, Naval Aircraft Factory, Philadelphia Navy Yard.

The LeBlond Model 5-D has a bore of 4.125 in., a stroke of 3.750 in., giving a total piston displacement of 250.58 cu.in. The compression volume ratio is 5.42 to 1. The overall diameter is 32¾ in., overall length 22¼ in. and the dry weight, complete, 222 lb. Nearly 90 per cent of the parts are interchangeable with other LeBlond models.

Cylinders are cast from nickel iron in single units with cooling fins integral. Each cylinder is held to the crankcase by eight studs which pass through the hold-down flange. The inner end of the cylinder barrel extends into the crankcase a distance sufficient to prevent over-oiling of the lower cylinders.

The outer surface is finished with a glassy black stove enamel capable of resisting heat. The inside and also the outer portion of the cylinder barrel below the flange is finished all over. The bore is held to close tolerances and given a good finish by honing. The combustion chamber is spherical in shape and provides seats for the interchangeable inlet and exhaust valves which are inclined at an angle of 30 deg. to the cylinder axis.

Valves are silichrome steel with 45-deg. seats. Removable valve guides are pressed into the cylinder. The interchangeable valve springs are of the volute ribbon type holding about 60 lb. at valve-open position. Each valve is held by a split retainer seating with a taper in the valve spring collar, and a wire safety clip circles the valve stem below the collar to prevent the valve from dropping into the cylinder. The cold tappet clearance is 0.015 in. and the hot tappet clearance 0.035 in.

Two spark plugs are provided at diametrically opposite positions front and rear. The inlet and exhaust valve ports face the rear, thus making the arrangement simple for the attachment of an exhaust collector ring.

Threaded sleeves are screwed into each port and protrude sufficiently to receive an annular packing nut. The inlet pipe need not be disturbed while removing a cylinder. Valve rockers are pressed on to the squared ends of the rocker shafts which are supported in bronze bushings pressed into the cylinder. Lubrication of these bushings as well as the enclosed valve parts is accomplished through a fitting from the outside.

The piston is aluminum alloy cast in permanent moulds and heat-treated to give the desired hardness. It has a full skirt and three rings above the piston pin, the lower ring functioning as an oil scraper. The head of the piston is of ample thickness for cooling and is also supplied with ribs underneath. The piston pin is hollow, the outer surface being casehardened and lapped to exact dimensions. In each end is pressed a duralumin plug to prevent the piston pin from scoring the cylinder walls.

Articulated-type connecting rods of an extremely simple design are employed. The rods are made from nickel chromium steel drop-forgings, being finished where necessary or for the special purpose of removing excess weight. By leaving the skin of the forging on the "H" section of the shank, considerable advantage in strength results.

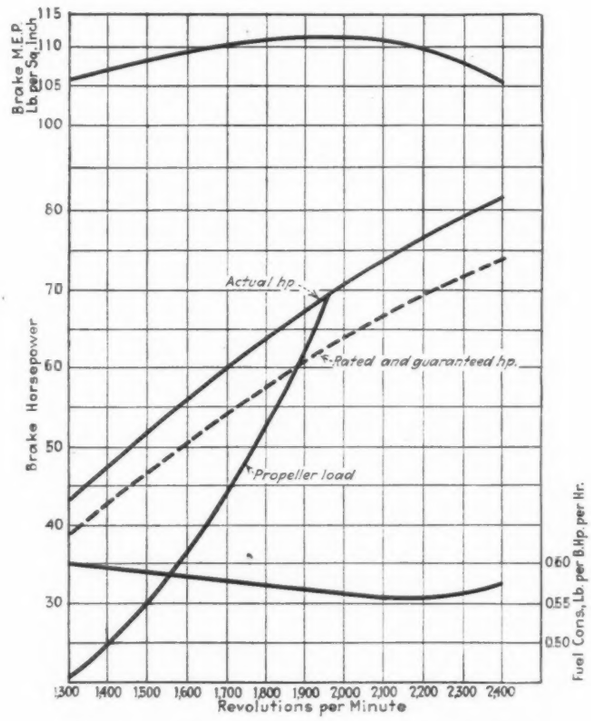
The master connecting rod and cap have a full bearing upon the crank-pin. The babbitt is applied directly to the steel and the two are bored to size. The cap is closely fitted to the master rod with a stepped joint and they are held together and doweled by four nickel steel bolts. These bolts also securely lock the wrist pins in

place, thus eliminating numerous small parts that are so frequently used. The bolts have thin square heads which rest against shoulders to prevent turning and they are made tight by long hexagon nuts locked by cotters. The master rod length (center to center) is 7.75 in.

Link rods are interchangeable, and would otherwise be reversible if it were not for the necessity of placing the end which has the oil hole to the outside to permit splash lubrication of the bearing. The bronze bushings which are pressed into each end of the link rod and into the upper end of the master rod are alike. Link rods are 5.9375 in. from center to center.

Wrist pins are hollow and the ends are closed by Welch plugs that are permanently secured by peening. The half-round slots in the wrist pins fit fairly close around the bolts, the undercut steps in the bolt being used in conjunction with drilled holes which line up with holes in the master rod and cap to supply oil under pressure to the interior of the hollow wrist pins. Midway on the wrist pin is a hole which leads oil to the link rod bushing. All wrist pins are interchangeable. The outer surface is case hardened, and exact dimensions together with a near-perfect finish are obtained by lapping.

The single-throw crankshaft is drop-forged in one piece from nickel chromium steel (S.A.E. 3240). It is finish ground all over and counterbalanced by bronze weights which shoulder against two lugs on opposite sides of each crank-cheek. These weights are located by



Power and fuel consumption curves for the LeBlond 5-D radial engine

screws which are permanently locked. The overall length of the crankshaft is 12.5625 in. and the journal diameter is 1.9684 in.

The crankshaft is supported upon two ball bearings, the one for the front being assembled later as it is locked endwise in the crankcase cover to carry the propeller thrust. The inner race of each bearing is locked on the shaft by a nut, and shoulders against a ring spacer which provides sufficient room for ample fillets between the crankshaft journal and cheek. The bearings are lubricated by splash.

For mounting the propeller hub, the crankshaft is provided with a tapered end in which there is a key slot and two tapped holes for the screws which retain the key. The shaft is hollow its entire length, the hole in the rear journal being made larger, and it is closed at the inner end by a Welch plug. The cam drive shaft, which forms a part of the gear case assembly, pilots into the end of the rear journal and is driven by the lugs which fit into the slot at the end of the crankshaft. These lugs are off center so it is impossible to assemble either crankshaft or gear case, except in the correct position, once the valve timing is adjusted. Oil enters the crankshaft under pressure through the hollow cam drive shaft. It then flows to the hollow crank-pin by means of a hole drilled through the rear crank-cheek.

THE CRANK-PIN which has a diameter of 1.75 in., is provided with three holes for feeding oil to the connecting rod bearing. The two smaller holes near the ends of the crank-pin are so located as to match each revolution with holes in the rod bearing that lead to the link rod wrist pins. All the oil being fed to the bearings must first pass through a special cast aluminum oil plug which is regarded as one of the interesting features of the design. This plug is so arranged that any heavy particles of dirt in the oil, which are naturally thrown to the outside by centrifugal force, become permanently trapped and are thereby prevented from passing through the bearing. Undoubtedly, this is a contributing factor to the long life of the connecting rod bearing. The oil plug is held in position by a cotter pin and it can be quickly removed at any time for cleaning.

As previously mentioned, the propeller hub is driven through a key on the tapered end of the crankshaft. A special nut with holes for a turning bar draws the hub up tightly on the taper. At the outer end of the hub is a puller nut against which the back face of the flange on the propeller hub nut bears when removing the hub from the crankshaft. These two nuts are provided with means for locking against turning when the hub is once in place. The propeller hub flange pilots on the front of the hub and the propeller pilots on both hub and flange and is held between the two by six special bolts and nuts. The hub has a body diameter of 2.689 in. and a bolt circle diameter of 4.625 in. The distance between flanges is 4.0625 in.

The crankcase is a heat-treated aluminum casting of high tensile strength. It has a large opening in front through which the crankshaft and connecting rods may be inserted as an assembly. This opening also serves as a pilot for the forged duralumin crankcase cover which is heat treated to obtain high tensile strength. It is held in place by fifteen studs. A similar opening with ten studs at the rear is the provision for attaching the gear case assembly, and the hollow dowel through which the oil passes to the scavenger pump serves as a locater.

The integral inlet manifold is a separately cored passage in the form of a ring with openings to receive the inlet pipes and one which connects with the carbureter through the crankcase oil sump. Hence, there are few joints which might possibly develop leaks, and the oil is cooled by the incoming gases.

The wall central with this inlet manifold ring provides a support for the rear crankshaft bearing. The ball bearing is supported directly on a steel sleeve which is pressed into the crankcase and held in place by three countersunk head screws permanently locked from turning.

Cast-iron bushings with holes ground to close limits are pressed into the crankcase to serve as guides for the cam followers. These cam followers are in the same transverse plane, this being made possible by the use of the single cam ring which will be described later.

The cam followers are made from an alloy steel heat-treated to give both hardness and strength. The followers are drilled for lightness and receive at the outer ends a push rod ball socket which is pressed into place. A special lock screw serves to keep the follower from turning about its axis and prevents any possibility of its dropping out when the push rods are not in place. At the inner end of the cam follower is a slot to guide the hardened roller and a half-round bearing for its two small journals. The safety wire is merely to insure that the roller will not drop out of place when it is not in contact with the cam as in assembly.

On the lower side of the crankcase, the finished pad with its studs provides a means of attaching the oil sump. Excess oil drains into this sump from the crankcase both front and rear, and from there the oil is drawn through the hollow dowel, locating the oil sump, as it is being returned to the scavenging pump. All studs are made from alloy steel, and the threads are held to close tolerances to insure good fits.

The front crankshaft ball bearing is supported by the crank case cover in a steel sleeve that is held in place by three countersunk head screws permanently locked from turning. This bearing is held endwise on the outer ball race to locate the crankshaft and to carry the thrust load of the propeller. Between the bearing and the crankshaft nut is an oil thrower which, together with threads in the front of the crankcase cover, prevents oil seepage to the outside. The nut on the crankshaft which screws up against the inner race of the ball bearing is locked from turning by the propeller hub key since it extends into one of the turning slots on the nut.

On the front of the crankcase cover is a name plate and four studs which are to be used for attaching a support for the forward end of the cowling.

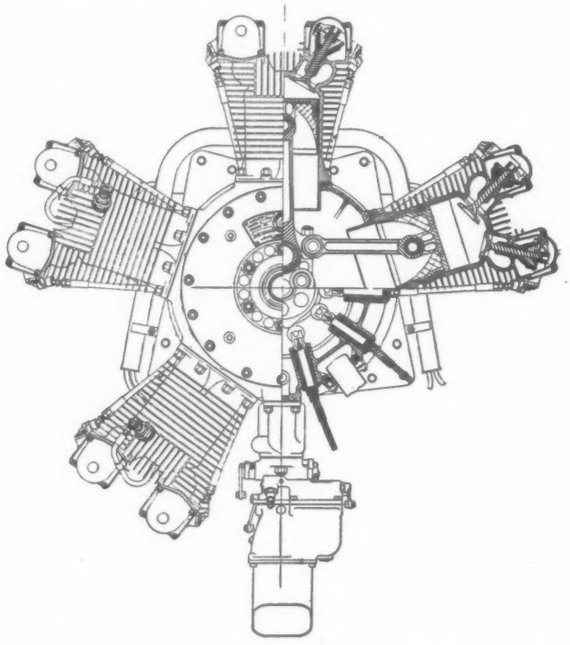
The gear case is assembled as a unit before it is incorporated into the final assembly of the engine. The case itself is an aluminum casting, having a round flange and pilot where it attaches to the crankcase. In the central wall are two bosses, each receiving bronze shoulder bushings pressed in from the ends. On top is a pad for supporting the magneto drive shaft housing, and in line with it at each side is a bracket for supporting a magneto. Below is a flange for attaching the oil pump, the cylindrical opening in the case serving as the outer housing for the oil pump when the latter is in place. Sufficient space is provided for assembly and adjustments by the opening at the rear.

The central boss supports the cam drive shaft. Oil enters the interior of this shaft through a hole which is in line with the space between the ends of the bushings, and it passes directly through into the end of the crankshaft. It has already been explained that the end of the cam drive shaft pilots into the end of the crankshaft and the two off-set lugs engage with the slot as a means of drive. The cam is provided with a bronze bushing since it floats on the cam drive shaft. Oil is fed directly to the bushing through holes in the wall of the cam drive shaft. The cam ring operates all valves and when the gear case is in place these cams are in line with the cam follower rollers.

At the rear end of the cam drive shaft is a spiral gear driven through a key. The nut which holds the gear up against a shoulder on the shaft is held from turning by a taper pin safetied by a cotter. This nut is furnished with a female splined end to receive a starter.

This spiral gear drives at half engine speed another spiral gear which pilots on the hub of the cam timing flange. The latter is keyed to the idler shaft and driven by four special screws which set the valve timing through the selection of a differential series of holes in the two pieces. When the timing is set, the hub of this flange is clamped against a hardened washer which rests against a shoulder on the idler shaft and also takes the gear thrust on the flange of the bronze bushing in the gear case. The clamping is done by a special nut provided with a drive for a tachometer cable. At the opposite end of the idler shaft is a gear meshing with the gear which is an integral part of the cam. The idler shaft bushings are lubricated by a pressure line in communication with the annular space between the cam drive shaft bushings.

Above and at right angles to the cam drive shaft lies the magneto drive shaft. Central on this shaft is a gear driven by the spiral gear which is located at the rear end of the cam drive shaft. Shoulder bushings are slipped upon the magneto drive shaft from each end. They are located between the two halves of the housing and prevented from turning by dowels. These bushings are fed with oil under pressure, and at each end of the shaft is an oil thrower as well as threads in the housing to return the excess oil to the gear case.



Front view drawing of the LeBlond 5-D engine with section cut away to show interior mechanism

The cast aluminum cover which closes the opening at the rear of the gear case is located by two dowels and

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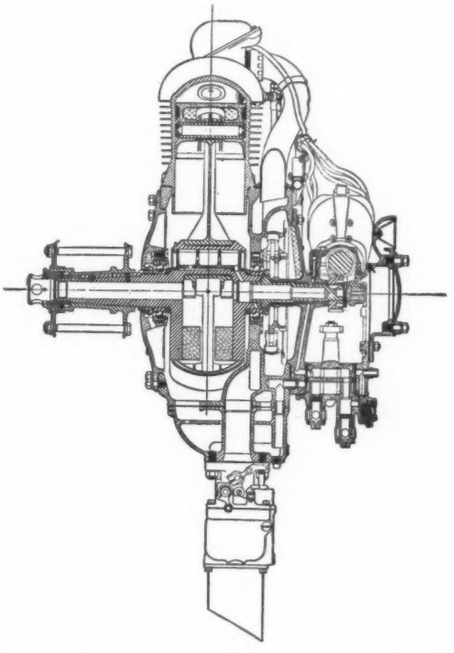
held in place by eight studs. In addition to the three long studs in the gear case, three other studs are fixed in the cover to permit either the mounting of an electric starter or the cover which closes the opening central with the crank axis.

In line with the idler shaft axis, a special stud is screwed and locked in the gear case cover to provide a means of attaching a standard tachometer connection. The breather, which is cast integral with the cover, has baffles to retain oil spray and a conical screen at the outside opening to keep out dirt.

The oil pump is built up of three main units: a lower body, an upper body and a plate. These parts are all aluminum castings. In the upper body are the pressure gears, the driver being integral with the oil pump shaft at whose upper end is mounted a spiral gear which meshes with the large half-engine-speed gear. The idler

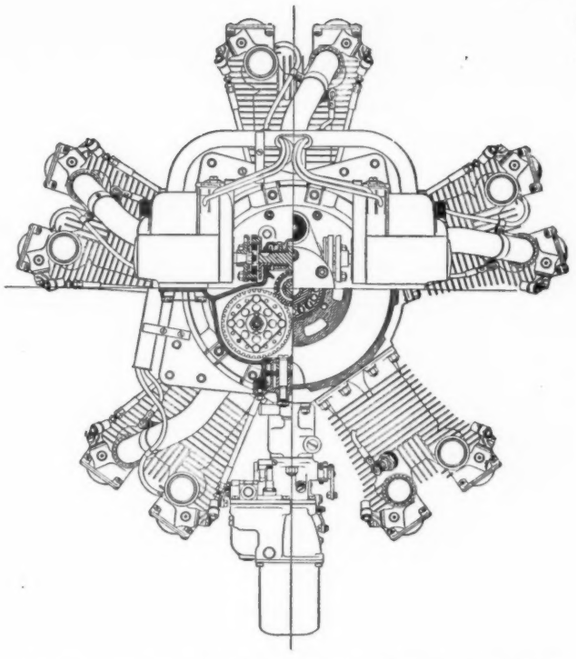


A transverse section of the LeBlond 5-D radial engine

pressure gear is bronze and it turns about a bolt which is used to tie the pump together. Oil enters the pressure pump through an opening in the plate and lower pump body. As it leaves the pressure pump, the oil must pass through a cylindrical screen of fine mesh, which is held between the upper body and plate. Once through the screen, the oil can enter the drilled openings in the gear case which lead to the bearings or to the pressure relief valve.

Below the plate in the lower housing are the wider gears for scavenging. The driver is steel and it fits over a square on the drive shaft. The driven gear is bronze and it centers on the same tie bolt as the pressure driven gear above. Oil enters the cylindrical opening in the gear case surrounding the pump through the hollow dowel which is used to locate the gear case. It must pass through a coarse mesh brass screen before entering the gears.

The pressure and scavenging oil connections for the lines to the outside oil tank are alike. A hollow stud draws the bronze connection up against the lower body,



Ae rear view sectional drawing of the LeBlond 5-D engine

a copper asbestos gasket being used above and below. These connections may be turned in any convenient position for the oil lines.

Excess oil from the pressure pump passes through a relief valve and re-enters the inlet side of the gears. The desired oil pressure may be obtained by screwing in or out the adjuster located at the lower rear of the lower pump body. The adjuster guides the relief valve, the latter being hollow to serve as a guide for the coil spring. The two oil connections, studs, the adjuster, as well as the two long screws, which help hold the three sections of the pump in a single unit, are all safetied by lock wires.

A Stromberg NA-R3 carbureter, having a main jet needle control, is provided and an air heater can be furnished as special equipment. Dual Scintilla magnetos (Model PN-5D) are furnished and rotation is at 1¼ crankshaft speed. Spark timing is fixed at 25 deg. advance. The designed timing (hot) is: inlet open, 0 deg.; Inlet closed, 60 deg. late; exhaust open, 60 deg. late and exhaust closed 0 deg.

The specifications as furnished by the manufacturer are as follows:

Model	5-D
Manufacturers' rating	60 hp. at 1,900 r.p.m.
Approved rating	65 hp. at 1,950 r.p.m.
Number of cylinders	five.
Cylinder arrangement	radial.
Cooling	air.
Bore	4.125 in.
Stroke	3.750 in.
Displacement (total)	250.58 cu.in.
Compression volume ratio	5.42 to 1.
Overall diameter	32¾ in.
Overall length	22¼ in.
Dry weight (complete)	222 lb.
Weight of mounting ring	5 lb.
Weight of exhaust collector (approximately)	6¾ lb.
Weight of carbureter air heater	3½ lb.

SYSTEM AND ORDER IN THE *Stock Room*

By WILLIS PARKER

THE stock room of the Alexander Aircraft Company, Colorado Springs, Colo., is well arranged and is conducted to facilitate the filling of requisitions and the distributing of materials to the various departments of the plant. It is also conducted so that it serves as a check against the control board in the factory office, and it is in turn checked by the control board against having too much or too little of any item in stock.

Let it be stated at the beginning that the stock room has its own delivery department and that no department foreman, or any of his employees, need to call at the stock room for materials in the regular run of production. The stock room delivers the materials to the departments on orders of the production superintendent, or his assistants. In some instances, the department foreman does not know, until he receives the material, that his department is expected to turn out certain work. Incidentally, we might mention that no one is permitted in the stock room except the members of the stock room staff and a few officials of the company.

We shall start the explanation of how this department is conducted by taking a hypothetical instance of an order for a job to be done. In the factory office is a book in which is listed the various items and quantities of items required for the construction of the numerous parts and sub-assemblies used in the construction of an airplane. A concrete example is a Hisso power plant. The construction of this unit requires 53 parts. The list of parts representing such a job is a "B2E" list.

The stock room foreman has a similar book. In case ten of such units are to be constructed, the requisition, as made out in the factory office along with the factory work order, specifies "Ten——B2E lists." When the stock room foreman receives the requisition, he looks up his B2E list and instructs his men to multiply it by ten when getting out the various items listed on it.

When the requisition is filled, the materials are transported by stock room employees to the department where the work begins. The department foreman inspects the materials, counts it, and then receipts the requisition. In the meantime, the factory order is on its way. Sometimes the materials arrive in the department before the factory order does, which explains why it is sometimes likely that the first intimation the department foreman has of his next job is the receipt of materials for it.

The bins in the stock room are located in such a manner that the materials stocks in them are placed nearest to the department in which they are to be first used. For example, the tubing is at the north end of the stock room, for the welding department is in the north section of the building.

Except on special jobs of experimental nature where no lists of materials have previously been compiled, it

The new Alexander Eaglerock Model 32 "Bullet," powered with a Kinner radial engine

is never necessary for the employees of any fabrication department to go to the stock room. Even on experimental work the materials are delivered only on requisition, and the requisitions must be signed by some one in the factory office. The factory's messenger service is sufficient to eliminate the necessity of a department foreman visiting the stock room for materials, inasmuch as he can make out his requisition, place it in a basket on his desk and it will be picked up by the messenger and delivered to the factory office clerk, who, in turn, passes it along to the stock room for action. The stock room delivery system then picks up the material and transports it to the department.

IT TAKES no stretching of the imagination to understand how much time in the construction departments this system saves, for without a doubt, if an employee was sent to the stock room to get some item, he would loaf around the stock room window waiting for the stock room clerks to get the material and deliver it to him at the window.

Even on loss of materials occasioned by damage in fabrication, it is not necessary for the department manager to go to the stock room for material to replace that which has been damaged. He makes out his loss and damage report, lists the material he will require and it follows the procedure of being picked up by the messenger and placed in the proper channels for action.

Not only are materials delivered by the stock room force, but much of them are prepared in the stock room. An example is tubing. The lengths and angles are specified on the order. The stock room cuts the tubing to the right length and at the proper angle, if it is a straight angle, whereupon the welding department needs only to mill it to the curve required. Next to the racks on which the tubing is stocked, are bins in which short lengths are kept. From this bin the stock room fills orders for short lengths. A tremendous saving in tubing results from this system.

The pick-up boys use boxes mounted on wheeled trucks for gathering up materials from the various bins. These are wheeled to the conveyor system where they are placed on a carrier, which is eighteen feet long and three feet wide, and is suspended by rods from the wheels that run along the overhead trolley. The overhead trolley system extends throughout the entire factory and outside to the paint, dope and lionoil departments, so the "chaser" merely pushes the carrier to the proper department and unloads the material where the department foreman requires it.

The control board in the factory office also acts as a perpetual inventory system. When the requisition has been filled and receipted for by the department foreman, it is turned back by the stock room foreman to the factory office where the amounts of each item are checked off the control board. As a double check on the control board, there is a little card in each stock bin with spaces indicated for five withdrawals, and the dates the withdrawals were made. When five withdrawals have been made, the card is removed and a fresh one tacked in its place. The card is sent into the factory office for comparison with the figures shown on the control board. If there is any discrepancy, it is immediately investigated.

Five withdrawals, as a rule, will be made in a short period of time and not so long a time that any failure in the system will prove a loss.

SINCE all materials, parts and sub-assemblies remain under the control of the stock room until they are included in completed planes, there are many incoming items—items fabricated in the factory from materials previously dispensed by the stock room. These items are inspected as they come in, the number received indicated on the withdrawal card and added to the total on hand. The factory office is then informed and the amounts received are indicated on the control board. The control board, in turn, prevents too much of any one item being on hand in the stock room at a time.

Large sub-assemblies, while still under the jurisdiction of the stock room, are not always moved into the stock room when completed, but are stocked in the assembly department, the stock room credited with them and they are withdrawn only on order of the stock room. This system saves on handling the materials too much, according to C. C. Hornaday, factory superintendent.

The receiving room and shipping room are given space in the stock room. All materials are inspected as they come in, whether from the suppliers of raw materials, or from the factory departments, are inspected as they go out and are again inspected by the department foreman who receives them. This eliminates much delay, and the issuing of additional requisitions to take care of defective material after it has been received in the department.

A three passenger, open cockpit Eaglerock biplane, powered with a Wright J-5 engine

GENERAL NEWS

Navy Balloon No. 1 Flies To Prince Edward Island

Unofficially Appears Balloon Race Winner

NEW YORK (N. Y.)—As we go to press, unofficial reports state that the balloon Navy No. 1, in an elapsed time of approximately 44 hr., has been landed near Charlottetown, Prince Edward Island—a distance of some 900 mi. from Pittsburgh where the bag took off in company with eleven others the morning of May 4 in the National Elimination Balloon Race for the Litchfield Trophy. If the reports prove correct and if the *Detroit Times* entry, yet unheard from, has not surpassed this mark, Lieut. Thomas W. G. Settle, pilot, and Ensign Wilfred Bushnell, his aide, fliers in the Navy No. 1, will be announced as the winners.

Contestants finishing first, second, and third in the Elimination race are to represent the United States in the International Gordon Bennett Balloon Trophy Race to start from St. Louis, Mo., Sept. 28. AVIATION will name this country's entries in the next issue, at which time official Elimination race figures will be available. The still-unreported Detroit entry is piloted by E. J. Hill, with A. G. Schlosser as aide, who previously held a time record of 26 hr. 45 min., established July 4-5, 1927. At the same time, S. A. U. Rasmussen piloted his entry a distance of 572 mi., a mark which is broken, according to indications, by the Navy No. 1 this year.

Records of Other Entries

On an unofficial basis, Ward T. Van Orman has traveled a distance second only to the Navy No. 1, having landed at Harkness, N. Y., a distance of 405 mi. Other entries were reported down as follows: "St. Louis," Capt. H. E. Honeywell, Middlesex, N. Y., 245 mi.; Army No. 1, Capt. W. J. Flood, Warwarsing, N. Y., 297 mi.; Army No. 2, Capt. E. W. Hill, Branch, Ulster County, N. Y., 294 mi.; Army No. 3, Lieut. L. A. Lawson, Roxbury, N. Y., 290 mi.; "The Pittsburgher," Dr. G. M. Legalee, Utica, N. Y., 280 mi.; Navy No. 2, Lieut. Jack Richardson, Apolio, Pa., 27 mi.; "American Business Club," A. C. Palmer, Mount Pleasant, Pa., 32 mi.; Aircraft Development Corporation, W. A. Klikoff, Lycoming, Pa., 160 mi.; and Detroit Balloon Club, S. A. U. Rasmussen, Camden, N. Y., 300 mi.

The balloons ascended from the University of Pittsburgh stadium on Saturday, May 4, at five-minute intervals beginning at 6 p.m., Daylight Saving Time. All were away with ease.

The start was scheduled for 5 o'clock but a heavy ground wind and a 50-mi. upper gale was blowing. Pilots and aides, with Meterologist E. G. Andrus, Hadley Field; Lieut. Charles E. Bauch, Lakehurst, operations manager, and Lieut. Comdr. Charles E. Rosendahl, of the Los Angeles, and referee of the race, conferred and it was decided to wait an hour.

The race culminated a three-day aeronautical exhibition held under the direction of the Aeronautical Association of Pittsburgh, and headed by former Congressman James M. Magee, Pittsburgh.

Exhibits under the grandstand included those of the Aluminum Company of America, Westinghouse Electric and Manufacturing Company, Standard Steel Propeller Co., United States Naval Reserve, Brilliant Airways, Inc., Aircraft and Airways of America, Inc., and Pittsburgh Aviation Industries Corporation, all of Pittsburgh; Clifford Ball, local air mail contractor; Pittsburgh *Post-Gazette*, and the H. H. Robertson Company.

Grant Far East Davis Franchise

RICHMOND (IND.)—Simmons Aircraft Division of Steel, Inc., Los Angeles, has been granted an exclusive franchise for the sale of the Davis V-3 monoplane in the far East, the Philippines, and the Hawaiian Islands, according to announcement by the Davis Aircraft Corporation, this city. The Simmons Aircraft Division is also contemplating activities in Central and South America.

Test Acme Parasol Plane

ROCKFORD (ILL.) — Clarence Helm, test pilot, took the first Acme Aircraft Corporation plane on its trial flight here recently watched by R. S. Link, Grand Rapids, Mich., who ordered the craft.

Instruct Cooper to Plan For Third Detroit Show

DETROIT (MICH.)—Because of the success of the first and second annual All-American Aircraft Shows, and due to the number of applications already received for space in the third, the Show Committee of the Detroit Board of Commerce, has instructed Ray Cooper, show manager, to prepare plans for the third event, and negotiate with the Aeronautical Chamber of Commerce, which body co-sponsored the last exposition, for its approval and sanction. Tentative dates for the 1930 show are April 5-13 inclusive.

Manager Cooper is authority for the statement that he has already received 29 applications for space in the 1930 show, one of which was received prior to the last show from a manufacturer who failed to get space in that show because of lack of it.

Negotiations with the Aeronautical Chamber of Commerce, it was said, will be held up several days, until the Detroit City Council can assure the Committee and the aircraft industry that the giant hangar and terminal building planned for erection on the city's airport will be ready for use next April.

The City of Detroit now is completing development of its airport property, valued at $6,000,000, with an additional $5,000,000 voted by the people last November. Although most of the $5,000,000 was to be spent in developing and enlarging the present airport, a total of approximately $1,000,000 has been set aside by the Council for construction of a large terminal building.

Design Hamilton 14 Place Craft

MILWAUKEE (WIS.) — According to an announcement by Charles F. Barndt, manager of the Hamilton Metalplane Company, plans have been drawn up for a twin-engined all-metal plane with a capacity of fourteen persons. They have been submitted to officials of the United Aircraft & Transport Corporation, holding organization. The Hamilton company now makes a single-engined seven-place plane, which is used by several airlines. The present plane sells for about $22,000, while the first of the proposed twin-engined planes would cost approximately $77,000 to build.

Starting Lenert Production

PENTWATER (MICH.) — An announcement from W. Lenert, of the Lenert Aircraft Company, this city, states the firm is about to go into production on its Model C three-place open all-metal biplane. A commodious plant is in readiness.

Department to Publish Sound Insulation Work

WASHINGTON (D. C.)—Bureau of Standards experimental work on the transmission of sound through various types of structures suitable for use as the walls of airplane cabins indicate that for single sheets of materials, weight per unit area is the predominating factor. Results of the experiments are to be made public by the Department of Commerce sometime this month.

The materials tested in the single sheet work varied from a sheet of wrapping paper to ¼ in. plate glass. Tests were also made on compound structures built up of alternate layers of different substances. By a proper combination it was possible to obtain a structure which had the same sound insulation value as a homogeneous material of three times the wight. Results have been noted for three frequency bands ranging from 150 to 1,120 cycles per second.

Three test flights have been made, two of them to test the sound insulation of two different types of cabins used in commercial practice. The third flight was made to test a special installation as a result of the laboratory experiments. The noise in the treated cabin was about the same as in a railway coach in motion.

To Build Dorniers at Detroit

DETROIT (MICH.) — Announcement is made here confirming reports that a group of Detroit financiers and industrial leaders will build Dornier Wal flying boats at this city, patents, rights, and manufacturing privileges having been acquired from the German firm. A. A. Schantz, head of the Detroit & Cleveland Navigation Company, Gar Wood, power boat expert, and Robert Oakman are among those reported connected with the project.

Irvings for South America

BUFFALO (N. Y.)—Arrangements for the sale and distribution of Irving parachutes in thirteen nations of South America are announced by the Irving Air Chute Company, this city, and the Curtiss Aeroplane Export Corporation. Irving chutes already are used in a number of South America countries. Col. Louis J. Campbell, chairman of the Irving Air Chute Company, stated that these contracts marked the first expansion of his company in the foreign commercial field.

Kreider-Reisner Firm Soon to Offer C-6 Model

HAGERSTOWN (MD.) — Kreider-Reisner Aircraft Corporation is now to go into production on its C-6 model, according to an announcement here, and a C-8 model, to use a Wright J-6 will also shortly be brought out. The C-6 is a two-place tapered-wing craft, which fitted with a Scarab is said to be capable of 140 m.p.h. with a climb of 1,500 f.p.m. The Kinner engine will also be employed in this model.

Some 250 men are now employed by the Kreider-Reisner firm, and it is said this number will be raised to 400 by June 1. Seven planes a week are now being turned out.

The first unit of the new plant is now nearing completion. This building, which will house a two-story office, is 120 ft. by 260 ft. With this structure, 82,000 sq.ft. of floor space will be available. According to reports, the new unit will care for four planes per day.

Fahlins Standard for Mohawks

MINNEAPOLIS (MINN.)—The Fahlin propellers manufactured by the Dakota Airplane Co. of Aberdeen, S. D., are to be standard equipment on Mohawk planes, it is announced.

Abreu Safety Plane Tested on West Coast

ALAMEDA (CALIF.) — Joaquin Abreu's safety monoplane, a machine built to allow the pilot to drop the engine in case of trouble and glide to earth in the resulting engineless craft, was tested here recently. In the trial, the power plant dropped into a sand dune, and Reed Vowles, pilot, overturned in the plane when he landed a short time later in rough ground. He was unhurt.

Fifty Firms Signed For St. Louis Show

Exposition to be Held From May 25 to June 1

ST. LOUIS (MO.)—More than 50 aeronautical concerns in St. Louis and elsewhere have reserved space for the first annual St. Louis Aircraft Show to be held May 25 to June 1 in the Coliseum under auspices of the Jackson Johnson, Jr., Post of the American Legion. Included are eleven plane manufacturers and two glider manufacturers.

Among the exhibitors are: Von Hoffmann Aircraft Company, St. Louis, one Von Hoffmann airplane; Curtiss Flying Service, St. Louis, two Curtiss Robins; Schlee-Brock Aircraft Corporation, Detroit, two Lockheed-Vegas; Nicholas-Beazley Aircraft Company, Marshall, Mo., one Barling monoplane; Mono Aircraft Company, Moline, Ill., two Monocoupes; Metal Airplane Company, Cincinnati, one Flamingo; St. Louis Car Company, one Cardinal; Southern Aircraft Company, Birmingham, two Southern Messers; Spartan Aircraft Company, Tulsa, Okla., two Spartans; Century Aircraft Company, Kansas City, two Centurians; Verville Airplane Company, Detroit; one Verville aircoach; Ta-Ho-Ma Airplane Company, Elgin, Ill., one Ta-Ho-Ma plane; Gliders, Inc., Orion, Mich., three German type gliders; Gardner Smith Company, St. Louis, two gliders.

Other exhibitors are: Universal Aviation Corporation, Brunner-Winkle Aircraft Company, Brooklyn; Balso Wood Company, Inc., Brooklyn; Kendall Oil Company, Bradford, Pa., airplaine lubricants; Harwen Products Company, New York City, engine accessories; Metalcraft Corporation, St. Louis, model airplanes; Vacuum Oil Company, St. Louis, lubricants; George D. Wanner & Company, Dayton, Ohio, model airplanes; Snap-On-Wrench Company, St. Louis, airplane tools; Shell Oil Company, St. Louis, lubricants; Summerill Tubing Company, Bridgeport, Pa., seamless steel tubing; Metallurgical Laboratories, Philadelphia; Fridley & Bryant, Detroit; American Legion, educational display; Boy Scouts of America, model display; Central Council, St. Louis High School Aero Squadrons, model and glider display; Thirty-fifth Division Air Service, Missouri National Guard, one Douglas 02-H equipped with three machine guns and bomb racks; U. S. Naval Reserve, one Vought Corsair, with machine guns and bomb racks; *Air Age*, St. Louis, and *Air Travel News*, Detroit, National aeronautical magazines; and St. Louis Public Library, historical display.

Thompson Offices Moved

CLEVELAND (OHIO) — Thompson Aeronautical Corporation is moving into its new suite of offices at 2010 Union Trust Building, this city.

Mono Craft Rights To British Concern

Fokker Purchases 1,000 Thermopete Oil Heaters

ST. LOUIS (MO.)—Allied Aviation Industries has made an arrangement with an English concern for the assembly of Mono aircraft and Lambert engines in England whereby the company's products will be distributed in the United Kingdom and all British dominions except Canada. Substantial sales are expected to materialize shortly in Australia and the Union of South Africa through the connections of the English company. Distributors also have been appointed in South Australia and the Philippine Islands, and negotiations are under way for the appointment of distributors in Canada and the principal countries of Central and South America, it is said.

The Fokker Aircraft Corporation has just placed an order with Aviation Accessories Corporation, a subsidiary of Allied Aviation Industries, for 1,000 Thermopetes for installation in Fokker planes. The device is used for heating the oil supply of airplanes prior to taking off and effects savings in time and engine depreciation.

Lambert engines are the same product turned out by the former Velie plant at Moline, Ill., which have been taken over by the Lambert Aircraft Engine Corporation, another subsidiary of Allied Aviation. The Mono Aircraft Corporation, a third subsidiary, acquired the assets of Mono Aircraft, Inc., also of Moline, and is continuing the manufacture of that firm's monoplanes, the Monocoupe, Monocoach and Monoprep.

Planes and engines will be taken apart before shipment abroad and then reassembled in England in order to avoid tariff charges.

Firms Change Names

ALBANY (N. Y.) — Roosevelt Field Flying School, Incorporated, Hempstead, L. I., has filed a certificate in the office of the secretary of state changing its corporate name to Roosevelt Aviation School, Incorporated, and changing its capital stock from $10,000 consisting of shares of $100 par value to 2,000 shares of non par value. Fairchild-Caminez Engine Corporation, New York City, has filed a certificate in the office of the secretary of state changing its corporate name to Fairchild Engine Corporation.

Winnipeg Expects 50 Planes

WINNIPEG (MAN.)—More than 50 machines, about half of which will come from the United States, are entered in the combined air show and flying meet to be held here May 24 and 25 under the auspices of the Winnipeg Flying Club. Among the planes expected is a Ford Transport from Detroit.

Inland Going Into Production

KANSAS CITY (MO.)—Inland Aviation Company here, maker of the two-place open monoplane, the Inland Sport, is getting ready to enter the commercial field. Lieut. Wilfred G. Moore, new sales director of the Inland firm, is not only a trained sales executive but has long been a flier, having served during the war with the Royal Flying Corps. Inland Aviation Company is headed by Arthur Hardgrave, while Dewey Bonebrake is vice president and chief engineeer.

Form Jensen Company To Manufacture Planes

NEW YORK (N. Y.)—A new company known as the Jensen Aircraft and Marine Corporation, this city, has been charted in Albany, with a capital of 1,000 shares no par value stock, to manufacture airplanes. Martin Jensen, who recently established a new solo flight mark in a Bellanca plane and who successfully completed the Dole flight to Hawaii, M. Hannigan Jensen, Hotel Victoria, New York City, and Abraham Weisinger, 175 Lehigh Avenue, Newark, N. J., are directors and subscribers.

It is stated that a large plot of ground has been acquired at Newark, where a field will be built. Here it is planned to manufacturer planes and also to develop and exploit certain patents, among them one of the gyroscopic principle for use with airplanes.

Southern Orders Planes

NEW ORLEANS (LA.)—A new six-passenger Travel Air sedan with new Wright J-6 powered, has arrived for use by the Southern Air Transport, Inc., in passenger service on its section of the New York-Mexico City line which passes through here. Five other planes ordered include a Travel Air (OX-5), a Wright-Whirlwind Travel Air (Whirlwind), a Command-Aire (OX-5), a Curtiss Robin (OX-5), and a Robin (Challenger). The new equipment will be added to six Pitcairn Mail-Wings, and one Fokker Standard Universal which have been transferred to the new field from the New Orleans municipal airport. Most of the new planes will be used by Texas Air Transport Flying School, a subsidiary of the Southern Air Transport.

Curtiss Boston School Opens

BOSTON (MASS.) — Curtiss Flying Service of New England, Inc., opened its ground school, May 6, in the Guggenheim building of the Massachusetts Institute of Technology, and classes will be held there until the completion of the Curtiss company's new executive and hangar building at the Boston airport. This ground course is in no way connected with the state university extension course or the regular M.I.T. aeronautical courses. Classes will be held three evenings each week.

Berliner-Joyce Firm Ceremony Has Features

BALTIMORE (MD.)—Gov. Albert C. Ritchie, Maryland, on May 4 laid the cornerstone of Berliner-Joyce Aircraft Corp. factory adjacent to Logan Field as the climax in ceremonies in which federal, state, city officials and military airmen participated. Rear-Adm. W. A. Moffett, chief of the Bureau of Aeronautics of the Navy Department, and H. H. Blee, of the Department of Commerce, have accepted invitations to attend. Maj.-Gen. James E. Fechet, chief of the army Air Corps, will also fly here if the weather permits.

Addresses will be made by Mayor William F. Broening, Admiral Moffett, Charles F. Goob, chief engineer of Baltimore; Governor Ritchie, and General Fechet. Airplanes of the Maryland National Guard will give a demonstration of flying. Prominent fliers who will be present include Lieut. James H. Doolittle, of the Army; Lieut. A. J. "Al" Williams, of the Navy; Lieut. George "Tex" Rogers, of the Marine Corps, and Capt. F. O'D. Hunter, chief of the tactical division of the Army Air Corps. Aerial acrobatics will be a feature.

Spartan Opens Tulsa School

TULSA (OKLA.) — The new Spartan Air School building was opened recently with several thousand visitors to the school and field from the city. Mrs. James C. Haizlip, aviatrix and wife of the chief instructor of the school, was hostess in an open house program. The new school occupies two main buildings, consisting of offices and classrooms. A dormitory for 40 persons with lounging rooms, writing desks, showers and other facilities, is one of the features. Further plans for improvement in the Spartan organization call for the erection of a $60,000 hangar and a showroom at the municipal airport. Space for three sales department offices, a complete repair department and storage for planes, together with a display room is to be included in the new hangar.

Conqueror Falcon in Fast Trip

GARDEN CITY (L. I., N. Y.)—A Curtiss company statement tells of a record trip between Tulsa, Okla., and Bolling Field, Washington, D. C., made in a Conqueror powered Curtiss Falcon by Lieut. Lewis M. Merrick, with Col. Patrick J. Hurley, Assistant Secretary of War, as passenger. The distance of 1,100 mi. was covered in 7 hr. 15 min., with a single stop at Wright Field, Dayton, for fuel.

Fokerts Designs Small Plane

MOLINE (ILL.) — According to reports, a so-called "mosquito" plane has been designed here by Clayton Fokerts. The small craft, already said to have been flown, has a span of but 24 ft. A high speed of 90 m.p.h. is reported.

To Move Reorganized Temple Firm to Dallas

TEMPLE (TEX.) — Removal of the Temple monoplane factory to Dallas within a few weeks, has been announced by officials of the company, reorganized this week, with $1,000,000 capital stock.

Manufacture of the planes had proceeded on a small scale since George W. Williams built his first craft at Temple in 1910. Large scale production is planned with recapitalization of the company.

A one-story building, covering 50,000 sq.ft. of floor area, and costing $125,000 will be erected immediately. It will be located at or near Love Field.

Four models will be built: the "Commercialwing," transport; the "Speedwing" open type designed for mail service; the "C-4," a five-place cabin job, and the "Sportsman," a two-place cabin "gadabout."

Directors and officers of the concern are: Charles M. Campbell, Temple, president; J. E. W. Thomas, Dallas, vice-president; George W. Williams, Temple; Charles G. Jester, Corsicana; E. K. Williams, Temple; Roy Sanderford, Belton; R. E. Shappell, Wichita Falls; G. A. Carroll, Temple; Sam Sparks, Austin; Walter C. Woodward, Coleman; Mike H. Thomas, Dallas; James P. Thomas, Dallas; and Col. Alvin Owsley, Dallas.

N.S.P.A. Elects Members

DETROIT (MICH.) — At a recent meeting of the executive committee, National Standard Parts Association, with headquarters in Eaton Tower, the following new members were elected: Jobbers—Bearings, Parts & Supply Company, Inc., Augusta, Ga.; Hart's Automotive Parts Company, Chattanooga, Tenn.; Collins & Leary, Bridgeport, Conn.; Sharp Auto Supply Company, Oklahoma City, Okla.; Associate Jobbers—Simonsen & Nielsen, Copenhagen, Denmark; Manufacturers—Ferodo & Asbestos, Inc., New Brunswick, N. J.; Mayhew Steel Products, Inc., Shelburne Falls, Mass.; Maremont Mfg. Company, Chicago, Ill.; The Perfect Circle Company, Hagerstown, Ind.; and Simonds Saw and Steel Company, Fitchburg, Mass.

Foote Exonerated in Air Crash

NEWARK (N.J.)—Reports here state that Lou Foote, pilot of the plane in which 14 persons were killed near the local airport, March 17, has been exonerated of blame by the Essex County Grand Jury. Foote had been held on a charge of manslaughter.

Texas Transport Orders Robins

ST. LOUIS (MO.)—Texas Air Transport has ordered seven Curtiss Robins. The Texas concern, which received two Robins recently, is a distributor for Curtiss-Robertson, maker of the plane, this city.

Savoia Fleet To Tour Country

NEW YORK (N. Y.)—A fleet of imported Savoia-Marchettis will be sent out on a demonstration tour of the country shortly, with Capt. Piero Bonelli as pilot and navigator, according to an announcement by Comdr. J. Lansing Callan, of the American Aeronautical Corporation, sponsor of the flight. Later Capt. Bonelli will serve regularly with the U. S. Air Express, a subsidiary corporation which is to operate flying boat lines.

Planning World Non-Stop Flight

NEW ORLEANS (LA.)—Announcement of a proposed non-stop flight around the world has been made by Lieut. Albert D. Hulse, U. S. A. Reserve, of this city, who is one of six Americans planning the trip.

Capt. Harry W. Lyon, navigator of the Southern Cross, has been mentioned as navigator for the trip. Lieut. L. T. O'Connell, radio officer at the naval air station, Lakehurst, N. J., will be another member, it is said. Names of the other three participants have not been announced.

The party plans to refuel in midair during the flight. A New Mexico capitalist has been interested in the flight and a plane is under construction. The take-off will be made early in the fall. Lieutenant Hulse recently disposed of a seaplane invention, a vacuum air break, which reduces the adhesion between the pontoons of a seaplane and still water, said to greatly facilitate an easy and safe take-off.

Union Carbide Units Move

CHICAGO (ILL.) — On May 1, the Chicago district and central division offices of various units of the Union Carbide and Carbon Corporation moved to the new 40-story Carbide and Carbon Building at Michigan Avenue and South Water Street. Among the units of the organization making homes in the structure are Linde Air Products Company, The Prest-O-Lite Company, Inc., Oxweld Acetylene Company, and the National Carbon Company, Inc.

Plan Candler Field School

ATLANTA (GA.)—Plans for a complete flying school to be established at Candler Field within the next 60 days have been announced by Robert Smith, of Fort Worth, Tex.

Breese Firm Applies For Portland Field Site

PORTLAND (ORE.)—First application from an aircraft manufacturing organization to lease ground owned by the Port of Portland adjacent to the Port of Portland airport has been received from the Breese Aircraft Corporation. The commission has adopted a policy of keeping a sixteen-acre tract on the mainland abutting on the causeway to the airport for lease to aircraft factories and allied interests.

The Breese application indicated a change of plan on the part of the company. When the Oregon company was formed to manufacture the Breese plane it was announced that the Watts airport at Beaverton, near Portland, had been acquired for the plant. This plan is said to have been abandoned in favor of locating the plant inside the city.

The company's offer was to lease one acre of ground from the port at the rate of about $100 a month for five years, with option on another acre and also on another five years.

Bradley A. Ewers, attorney and member of the board of directors of the Breese concern, made the application. He said his company planned to erect a $12,000 building at once as a nucleus of its factory. An additional unit would be added each year.

The port commission postponed final action on the application. The body decided to permit use of the airport by flying schools only under agreements including strict enforcement of regulations imposed by the port.

Laboratory Building For Stout Engineering

DETROIT (MICH.)—Stout Engineering Laboratories, Inc., reorganized several months ago by William B. Stout to carry on experimental work independent of his other interests, is erecting a temporary laboratory building at 1418-20 Telegraph Road, Dearborn, it recently was announced.

The new building is a 60 ft. x 75 ft. frame structure, and will be completed by June 1. Since reorganization, the company has occupied space in a Dearborn office building.

Mr. Stout originally organized the Stout Engineering Laboratories when he first returned to Detroit following the war. The corporation later was reorganized as the Stout Metal Plane Company, and in July, 1924, was absorbed by the Ford Motor Company, becoming that organization's airplane division.

Southern Firm Offices Moved

BIRMINGHAM (ALA.)—Local offices of the Southern Air Transport have been moved from the Lincoln Life Building to the mezzanine floor of the Tutwiler Hotel, according to Leary Redus, Birmingham manager.

Rockford Now Getting Third Airplane Factory

ROCKFORD (ILL.)—The third airplane manufacturing plant in this city will be in operation within a short time, it is announced, following reorganization of the Monarch Aircraft Company as the Monarch Aircraft Corporation with $250,000 capital. The corporation will conduct an airport and maintain an aviation school in addition to its manufacturing activities.

Six Monarch planes are already in service and a new sport model craft is being built. The plane is 22 ft. 6 in. over-all, with an upper wing spread of 32 ft. 6 in. and a lower wing span of 31 ft.

A hangar, 80x120 ft., costing $12,000, will be erected immediately at the company's port on the North Second Street road for accommodation of the Rockford Aviation School, which the firm operates and which now has an enrollment of 31.

William Beuschel is head of the company, Herbert L. Millington is general manager, and Art Rosa, is chief engineer and builder and is assisted by Fred Stahle, Chicago, airplane designer.

Special Cessna for World Trip

WICHITA (KAN.)—Clyde V. Cessna, president of Cessna Aircraft, announces his factory force is building a cantilever wing monoplane of Cessna design for Parker Cramer for use on a flight round-the-world. Huge gas tanks are being built into the plane. Cramer, who was forced down in Greenland a year ago while on a flight to Stockholm, Sweden, from Rockford, Ill., recently flew a stock model Cessna to Nome, Alaska, from Wichita. He covered the distance of 5,500 mi. in an elapsed time of approximately 48 hr. The plane he flew was the one that Earl Rowland flew to victory in the transcontinental derby last year.

Form Bennett Airways, Inc.

KANSAS CITY (MO.)—Growth of the activities of Dr. George L. Bennett has brought into existance a new organization—Bennett Airways, Inc. The company, an outgrowth of the Bennett-Eaglerock Sales Company and the Bennett Flying School, has just received a charter. A five year lease on the airport at Independence, Kan., has been taken by the company and it is probable one of the Bennett schools will be moved there.

S.A.T. Firm Buys Douglas

ATLANTA (GA.) — Douglas Davis Flying Service, Inc., this city, has been purchased by the Southern Air Transport Company, Inc., of Fort Worth, Tex. The Davis organization will be known as the Atlanta branch of the Southern company, and Douglas Davis will remain as manager.

Stout-D. & C. Acquires Skyview

BUFFALO (N.Y.) — Acquisition of Skyview, Inc., this city, by Sout-D & C Air Lines, Inc., is now announced. The Skyview concern, which has operated sightseeing planes over the Falls, will "further diversify" the aerial transportation of the Stout organization, which is offering service flying boat service between Detroit, Cleveland, and this city.

New Firms Announced

SEYMOUR J. BAUM, INC., Queens, New York City: capital of 1,000 shares; by Seymour J. Baum, Anne M. Baum, 798 Broadway, Flushing, Richard Simmons; to manufacture aircraft.

S. P. STORY CO., INC., New Rochelle, N. Y.; capital $150,000; by Charles P. Andrews, Harry P. Bray and Doris J. Mitchell; to manufacture aircraft.

GILPLANE HOLDING CORPORATION, 136 Liberty St., New York City; capital 100 shares non-par value stock; by Lambert Fairchild, Marie F. Stewart, William F. Howell; to promote aviation.

ROOSEVELT FLYING CORPORATION, 1235 Park Ave., New York City; capital of 2,000 shares non-par value stock; by William J. Cullen, Dorman T. Connet, Howard F. Mulholland; to operate aircraft.

VALLEY AIRLINES, INC., Memphis, Tenn.; by W. F. Murrah, Fidelity Bank Bldg., and others.

INTERNATIONAL TURBINE AIRWAY CORPORATION, chartered under Delaware laws, 29-28 Hunter Avenue, Long Island City, N. Y.; capital $2,500,000, by Karl Hamm; to deal in aircraft.

EARL L. HOUSE & CO., INC., 45 Prospect Place, New York City; capital $20,000, by Annette Day, Earl L. House, and Clayton B. Davis; to deal in aircraft.

Consolidated for Air Services

NEW YORK (N.Y.) — An order for 300 tachometers has been placed by the Navy service and one for 550 air speed indicators by the Army air service with the Consolidated Instrument Company. The former instruments are of the centrifugal type, employing a uniform scale over the entire dial. The air speed indicators for the Army air service are of a new design utilizing the pitot-static principle, and with all mechanism made of non-corrosive materials.

Five Vegas for S.A.F.E.

TULSA (OKLA.) — Five Lockheed Wasp-powered Vegas have been added to the equipment of Southwest Air Fast Express, Inc. The planes will be used for special cross-country work, according to Bob Cantwell, chief pilot. For the present all five will operate from the Tulsa headquarters, but when terminal facilities are completed at the various airports the planes will be stationed at the regular S.A.F.E. stops.

Pal-Waukee Contracts To Deliver Newspapers

MT. PROSPECT (ILL.)—The *Chicago Daily News* has signed a two-year contract with the Pal-Waukee Airport, this city, according to D. Hodges, general manager, for the delivery of that 2,250 lb. of newspapers daily to the resort points in this area, from July 1 to Sept. 1.

Three routes will be run as follows: Route one, Chicago to Eagle River, Wis., thence to Three Lakes and return to Chicago, round trip distance of this trip, 660 mi.; route two, Chicago to Benton Harbor to South Haven to Saugatuck and return to Chicago, round trip distance of this run, 310 mi.; route three, Chicago to Lake Geneva to Rockford and return to Chicago, round trip distance of this run, 187 mi. The total distance covered daily will be 1,100 mi.

The three runs will be accomplished by means of two new Bellancas. The Rockford run will be accomplished with an open cock-pit craft. With the outbound trip the craft will carry newspapers only. On the return trip passengers will be carried.

Portland Spruce in 60 Days

PORTLAND (ORE.) — Production of raw spruce lumber for the aeronautic industry will be started in Portland by the newly organized Portland Spruce mill within 60 days, according to announcement of Thomas Autzen, vice-president. New machinery is now being installed. Associated with Mr. Autzen in the venture are C. G. Blagen, manager of the Grays Harbor Lumber Company, and J. S. Taylor, Grant Robertson, and Lee Hubbard, of the Multnomah Lumber & Box Company. Mr. Blagen is president and manager.

Arrange Michigan Tour Stops

PONTIAC (MICH.)—The tentative itinerary announced for the Michigan air tour, is as follows: June 10—Detroit, Monroe, Ann Arbor, Lansing, and Jackson; June 11—Sturgis, Niles, Benton Harbor, Kalamazoo, Battle Creek, Grand Rapids, Grand Haven, and Muskegon; June 12—Ludington, Manistee, Cadillac, Traverse City, and Petoskey; June 13—Harbor Springs, Mackinaw City, Alpena, Oscoda (Camp Skeel), and Bay City; June 14—Saginaw, Flint, Port Huron, Mt. Clemens and Pontiac.

Organize Atlanta Plane Firm

ATLANTA (GA.)—The Atlanta Aircraft Corporation is now in the process of obtaining its charter in this state with a paid in capital of $300,000. The company is to engage in the manufacture of tri-engined all-metal planes and expects to turn out its first product by the latter part of September, according to Edward Whitehead, an official of the concern. The machines will be known as Prudden Whitehead planes.

Name Byrket to Direct Indianapolis Exposition

INDIANAPOLIS (IND.)—Personnel for the executive committee of the Indianapolis aircraft show, to be held at the state fairgrounds here May 27 to June 2, has been announced as follows: Harold C. Brooks and Hubert Shank Hoosier Airport; H. Weir Cook and Charles E. Cox, Jr., Curtiss Flying Service of Indiana; J. T. Fishback, Silver Wing Aircraft Co.; Elmert H. Jose and Lee H. Hottel, Capitol Airways, Inc.; Paul H. Moore, municipal airport manager; Lieut. Walter Peck, Schoen Field (Ft. Benjamin Harrison), commander; and Clyde Shockley, Shockley Flying Service, Kokomo. J. E. McDuffe, vice-president Presto-Lite Storage Battery Corporation, has been named president of the committee and B. L. Byrket has been named exposition manager. Thirty-four planes and a number of accessory exhibits have been entered in the show.

Exhibitors Issued Cleveland Show Data

CLEVELAND (OHIO)—An announcement has been issued to prospective exhibitors at the Aeronautical Exposition, to be held Aug. 24 to Sept. 2 in conjunction with the National Air Races at this city.

The Public Auditorium cost $10,000,000 and contains more than 200,000 sq.ft. of floor space. A railroad siding adjacent to the Auditorium will simplify transportation of exhibits and will reduce cartage costs. Although situated on the Lake, the hall is within easy walking distance of the downtown and hotel district.

Rates for airplane space is $.40 per square foot; instruments and accessories $1.25 per square foot; airplane engines and engine units $1.50 per square foot; airport equipment, industrial and fabrication materials $1.50 per square foot. All booths offering double frontage are subject to 20 per cent increase.

Beckley College Offers Course

HARRISBURG (PA.) — Beckley College, this city, is now ready to give a two-year aeronautics course, according to Charles S. Smith, dean. The instruction is a development of the regular engineering courses offerred and is designed to qualify entrants as licensed mechanics, with flying work available through co-operation with the Curtiss Flying Service at the Harrisburg Municipal Airport.

Tuxhorn Trains on Four Types

KANSAS CITY (MO.) — With the purchase of a Barling N-B 3 monoplane, the Tuxhorn & Son Flying School, this city, now has four types of craft for student instruction. The others are American Eagles, Eaglerocks, and Monopreps.

Black Hawk Planes Sold

KANSAS CITY (MO.)—Wilton M. Briney, sales manager of the Butler Aircraft Corporation, announces the company has sold or has signed contracts for five of the company's new Black Hawk planes. One of the planes was sold to the Art Goebel Flying School. Col. Art C. Goebel, president of the school, is having the plane equipped with extra gasoline tanks and expects to make a non-stop flight in the plane from Kansas City to Los Angeles some time this summer.

Representatives Named

TRAVEL AIR — Kari-Keen Flying Service, Inc., Sioux City, Iowa, of which Merle Cornell is manager; named agent for Iowa and Nebraska and will handle craft as well as Kari-Keen cabin monoplanes made by parent company; agency obtained from Mid-West Aviation Corporation, Omaha, of which Mr. Cornell is a director.

TRAVEL AIR—Eau Claire Airways, Inc., Eau Claire, Wis., of which J. R. Davis is president and J. S. McMillen, vice-president and secretary; named sales representative for twelve counties in that section.

TA-HO-MA—John S. Stevens, Evansville, Ind., sales representative of the Ta-Ho-Ma Airplane & Motor Company, reports an agency will be established in Evansville.

PRATT & WHITNEY — Braniff Air Lines, Oklahoma City, Okla., assigned a service agency in this southwestern territory, according to reports.

FLEET and FAIRCHILD — Roosevelt Field, Inc., L. I., N. Y., sales agencies acquired.

Aerial Service Now Mercury

HAMMONDSPORT (N. Y.)—Directors of Aerial Service Corporation, this city, announce that the name of the company has been changed to "Mercury Aircraft, Inc." "The policy of Government aircraft design and manufacture," it is stated, "will be continued, and in addition the scope of commercial aircraft activity will be increased."

Des Moines School to Mid-West

OMAHA (NEB.)—Mid-West Aviation Corporation here has acquired the Des Moines Airways Corporation flying school at the latter city, with F. C. Anderson, former owner, retained as superintendent. During the past few weeks, enrollment in the Mid-West schools has increased from 34 to 66 students.

To Start Wallace Plant

ROCKFORD (ILL.)—Construction on the new factory of the Wallace Aircraft Corporation will start here shortly. A tract of 160 acres was leased by this corporation and a factory flanked by hangars will be constructed upon it.

New Wichita Firm To Build Low-Wing

WICHITA (KAN.)—Wichita's fourteenth airplane manufacturing company is announced by William P. Sullivan, formerly with the Fokker company. This new company plans first to build a three-place low-wing monoplane to be powered by a Kinner engine. It is planned to have the first machine in the air by the middle of June.

The company has purchased an 80-acre airport and will erect a modern factory. When occupied it is planned to build three planes weekly. The first model is being built in a temporary factory. The wing spread of the plane will be 36 ft. with an overall length of 22 ft. 3 in., according to Mr. Sullivan.

Mr. Sullivan will be chief engineer and general manager. Romer Weyant will be production superintendent and chief test pilot, and Jean Fradiss, will be consulting engineer. Others financially interested in the company are Edgar L. Bales, Judge J. E. Alexander, and Theodore M. Glenn, all of Wichita.

Coffman Adds Many Workers

OKLAHOMA CITY (OKLA.) — Between 40 and 50 men have been added to the staff of Coffman Monoplanes, Inc., with the organization getting into full swing on production of its monoplanes.

Heated Electrically

Here is an electrically heated flying suit recently developed by Dr. B. R. Charles, Los Angeles, Calif. Current is sent through a mesh of copper woven into the lining of the garment as shown in the photograph. The electricity is supplied to the suit by a single wire from a battery placed in the plane's cockpit, and special connections are provided for helmet and gauntlets.

BRIEFLY

Montrose W. Hays, meteorologist in charge of the United States Weather Bureau at St. Louis, has declared that the city is one of the most favorable for flying on account of the absence of freezing rain conditions.

Gold and white badges, symbolic of the first air mail flight from Omaha to St. Louis, were distributed by the Chamber of Commerce to St. Louis and Kansas City business men and aviation officials.

Southern Air Transport will fly its mail planes through from Atlanta to New Orleans hereafter without changing machines at Birmingham. The emergency plane probably will be kept at Candler Field, Atlanta.

A weather observation station has been established at Hilt, near the California-Oregon line, to serve the Oakland-Medford airway.

The Atlanta Junior Chamber of Commerce will sponsor an air mail week at Atlanta May 14-19.

Construction of a seaplane channel and wind tunnel building by the N.A.C.A. at Langley Field, Va., has been approved by the War Department.

All three of the recent holders of the women's endurance record, Miss Viola Gentry, Mrs. Louise McPhetridge Thaden and Miss Elinor Smith, are reported to have used Champion spark plugs in the engines of the planes used to establish the records.

Separation of the Government Air Corps from the Army, Navy and Department of Commerce to a single department is opposed by Rear Admiral Thomas P. Magruder, U. S. N.

Commercial privileges are being allowed at the army base at Hanapepe Kauai, Territory of Hawaii.

A native of Alaska recently was carried by plane to Seattle in a race to save her life by immediate attention of a specialist. The plane was piloted by Ansel Eckman and navigated by Robert E. Ellis in an 11-hour trip.

Four Sikorsky amphibions have been ordered by the Navy for use in the training course given students at the Naval Academy. Seven students may be carried in addition to a pilot, mechanic and instructor, permitting group instruction.

Transport pilots may be appointed second lieutenants in the Air Corps Reserve, it has been announced, and be detailed for one year's service with the army. This measure is being taken to complete the quota allowed for Air Corps operations.

Production for this year is expected to reach $2,000,000 instead of $1,000,000 as originally set for the Hamilton Aero Manufacturing Company, it has been announced. More employees are being engaged and about $200,000 worth of machinery is being installed to meet orders.

Harold F. Pitcairn has returned from Europe following a series of conferences with Juan de la Cierva, inventor of the Autogiro, which Pitcairn is to manufacture in this country.

Pacific Aviation Company is the name of the subsidiary of the Missouri Pacific Railway Lines, now investigating the possibilities in co-ordinated air and rail transportation.

A flying club has been organized at Williams College, Williamstown, Mass.

Louisville, Ky., has abandoned plans to entertain Graf Zeppelin crew on learning that the visit to this country will be very short.

Pioneers Flyers, Inc., is to operate the Mason City, Ia., Airport.

The annual Denver air meet will be held August 9-11.

Menefee Field, New Orleans, La., is now a distributing point for Wright Aeronautical Company's parts.

Diego Arzena of Buenos Aires has bought a Davis V-3 monoplane.

The value of airport facilities was emphasized at the annual aviation luncheon of the National Association of Commercial Organization Secretaries at Washington recently.

Pitcairn Aviation on May 1 completed its first year of operation of the New York-Atlanta route.

It has been reported that there is a possibility the Command-Aire, Inc., plant may be moved from Little Rock, Ark., unless improvements are made at the municipal airport.

Service planes and instruction planes of Curtiss Flying Service and National Flying Schools of Buffalo are to be equipped with Irvin Air Chutes.

The Navy's experimental metal-clad dirigible is nearing the inflation stages, it is said.

Maddux is reported negotiating with eastern air lines operators.

Edgar Birscak, of New York City, has won the A. W. Brown traveling scholarship for a design of a memorial to Lindbergh's New York-Paris flight.

Miss Dagnya Berger, Norwegian woman pilot, is coming to this country to prepare for a trans-Atlantic flight in August.

Bert Acosta's Armada A is said to have passed its first wind tunnel test at New York University recently.

The Air Corps is reported developing a service attack plane capable of developing a speed of 200 m.p.h. with full military load.

A net income of $138,311 for the first three months of this year has been reported by Air Investors, Inc., of New York City.

Copper tubing for airplane radiators is being manufactured by the Winchester Repeating Arms Company of New Haven, Conn.

The Mohawk Aircraft Corporation of Minneapolis, Minn., is planning to establish an assembly plant at Atlanta.

Maxine Dunlap of Oakland, Calif., has qualified as the first American woman glider pilot, by a flight of 990 ft. in which she reached an altitude of 175 ft. above the starting point.

Boeing expects to have its 18-passenger transports on service on the Chicago-San Francisco line by August 15.

Hancock Foundation College, said to be a non-profit flying school, has been organized at Santa Maria, Calif.

The engine built by the Alliance Aircraft Corporation, Alliance, Ohio, is reported to have passed its government test-stand trials.

Bolte Aircraft Company, Des Moines, Ia., may move to Wichita, Kan., according to Floyd F. Davis, of the concern.

Work of many high schools in teaching aeronautics is being described in a pamphlet to be released soon by the Guggenheim Fund.

The New York Aviation Show is to be held February 7-15, 1930, under auspices of the Aviators' Post, American Legion.

Freight and passenger air service between Newport, R. I., Block Island, New London and Montauk Point, is being arranged by Rhode Island Airways.

AERONAUTICAL CALENDAR

May 14	Fourth Annual Aircraft Engineering Research Conference, Langley Field, Hampton, Va.
May 15-20	First International Congress on Sanitary Aviation, Paris, France.
May 16-18	Cleveland Airport Convention, Hotel Cleveland, Cleveland, Ohio, under auspices of the Aeronautical Chamber of Commerce.
May 18	Curtiss Marine Trophy Race, Potomac River, Anacostia, D. C., under auspices of the Aero Club of Washington, N.A.A.
May 24-27	Aviation Show and Flying Meet, auspices Winnipeg Flying Club, Winnipeg, Man.
May 25-June 1	First Annual St. Louis Aircraft Show New Coliseum, St. Louis, auspices Jackson Johnson Post No. 72, American Legion, Headquarters Hotel Chase.
May 27-30	American Society of Mechanical Engineers, National Aeronautic Meeting, Hotel Jefferson, St. Louis.
May 27-June 2	Indianapolis Aviation Show of the Indianapolis Aircraft Association, State Fair Grounds.
May 28-30	Gardner Annual Trophy Race, St. Louis, Mo.
June 1-8	North Dakota Air Tour, starting from Grand Forks.
June 10-14	First Michigan Air Tour, Starting at Pontiac Municipal Airport.
June 20 22	Second National Model Plane Meet Detroit.
June 27-30	International Light Plane Meet, Amsterdam, Holland.
July 13	Annual Royal Air Force display, Hendon, England.
July 16-27	International Aircraft Exhibition of the Society of British Aircraft Constructors, Olympia, London.
Aug. 24-Sept. 2	National Air Races and Aeronautical Show, Cleveland, O.
Aug. 26-28	Society of Automotive Engineers, Cleveland Aeronautic Meeting.
Sept. 6-7	Schneider Cup Race, over the Solent, Cowes, England.
Sept. 7-15	International Aircraft Exhibit of 1929, Coliseum, Chicago, Ill.
Sept. 28	Gordon Bennett Balloon Trophy Race, St. Louis, Mo.
Oct. 12-27	Southwestern Aircraft Exposition, State Fair Grounds, Dallas, Tex.
Dec. 1-9	International Aeronautical Exposition of the Aeronautical Chamber of Commerce, Chicago.

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PERSONNEL

LESTER F. BISHOP is to be one of the pilots on the new Detroit-Cleveland amphibion service which the Thompson Aeronautical Corporation starts May 14. Bishop has been pilot on the Kalamazoo-Pontiac division and later company airways engineer.

RALPH DEVORE, who has been flying the Chicago-Muskegon mail route of the Thompson company, is to be chief pilot on the Detroit-Cleveland run.

HARRIS M. HANSHUE, president of the Fokker Aircraft Corporation of America and president and general manager of Western Air Express, has been elected to the board of directors of the Aero Corporation of California.

HARRY D. COPLAND, recently appointed manager of the Hartford, Conn., branch of the Curtiss Flying Service of New England, has been placed in charge of all the Curtiss primary flying schools in the New England district and is now taking the month's course for Curtiss instructors at Detroit. Copland will be succeeded by SANFORD B. CHANDLER.

TED KINCANNON, general manager of the Curtiss Flying Service, Bowman Field, Louisville, Ky., has been elected vice-president of the Curtiss Flying Service and will be in charge of all Curtiss activities in the state of Kentucky.

LEONARD RHINER, formerly with the Nicholas-Beazley Airplane Company, Marshall, Mo., is now pilot for the Beacon Airways of America, Inc.

LARRY D. RUCH, formerly chief instructor for the Porterfield Flying School, Kansas City, is now chief test pilot for the American Eagle Aviation Corporation. ART WINTHEISER will be his assistant.

MAJ. ROBERT COKER, Army Air Corps, who has been commanding officer of the Army Intermediate Air Depot at Little Rock, Ark., is to be transferred to Fort Sam Houston, San Antonio, Texas, as Eighth Corps Area air officer. It is reported that LIEUT. L. R. HEWITT, National Guard instructor at Little Rock, may succeed Major Coker.

PAUL SCOTT, formerly with Varney Air Lines and the Scenic Airways, Inc., is now flying for the Mexican Aviation Company between Brownsville, Tex., and Mexico City.

CAPT. D. W. ALEXANDER of California has been added to the flying staff of Challenger Flying Service, Hagerstown, Md.

HOWARD JONES, test pilot for the Knoll Aircraft Corporation since its organization, has resigned to join the Aeronautics Branch.

EDWIN B. RESSER, president of the Barnsdall Oil Corporation, has been named president of the Braniff division of the Universal Aviation Corporation at the first directors meeting. PAUL R. BRANIFF was elected executive vice-president, L. H. ATKINSON, vice-president in charge of operations, GEORGE SCHIERBERG, of St. Louis, treasurer; E. P. BROWN, of Oklahoma City, assistant treasurer; T. G. LOGAN, of Tulsa, secretary; and PAUL MOORE, of Oklahoma City, assistant to the operations manager in charge of equipment.

L. C. HILDEBRAND has been transferred from St. Louis to Omaha in charge of the mail and passenger service of Universal Aviation Corporation.

E. B. FRICKS and M. D. ATOR have been appointed chief pilots on the Southern and Northern divisions, respectively, of Interstate Air Lines, Inc.

J. R. FARNEMAN has been appointed assistant treasurer and secretary of the Robertson division of Universal Aviation Corporation, St. Louis, Mo., and HAYS WALTER has been appointed manager of the aeronautical supply department.

GEORGE MCCABE of South Bend, Ind., has been appointed pilot on the St. Louis-Kansas City passenger route of the Universal Aviation Corporation.

C. H. GRIFFIN, formerly of the Curtiss Flying Service, has been appointed eastern sales representatives of the Mahoney-Ryan Company.

ORVILLE E. SCOTT has resigned as manager of Lambert-St. Louis field after six years' service to become pilot for Air Transportation Company on the Pacific Coast. O. R. PARKS, his assistant, is temporarily in charge of the field.

JOSEPH H. ROWAN has become editor of *Pacific Airport News*, a monthly aviation magazine published in Portland, Ore., succeeding M. F. Wright, former editor and one of the founders of the magazine.

PAUL H. MOORE, secretary of the aeronautics committee of the Indianapolis, Ind., Chamber of Commerce, has been appointed superintendent of the municipal airport.

ROY A. BISHOP, well-known railway traffic official, has been appointed general traffic manager for the Universal Aviation Corporation.

C. L. OFENSTEIN, former chief of the Engineering Section of the Aeronautics Branch, has been elected director of the Gates Aircraft Corporation.

C. C. MOUTON is chief inspector of the western division for the Aeronautics Branch with offices in San Francisco.

LIEUT. F. O. DICE, on leave from Mitchel Field, is assisting George E. Walker, head of the Albany Air Service, in reorganizing the flying school operated by the concern.

GEORGE E. LOVE, chairman of the national committee of aeronautics for the American Legion, has been named special sales representative for the Breese Aircraft Corporation.

WARREN PACKARD, of the Packard Motor Car Company, has been re-elected commodore of the Detroit Air-Yacht club. Other officers are: Vice-Commodore, CAPT. L. M. WOOLSON; Rear Commodore and Treasurer, LOUIS C. HUCK; Rear Commodore and Secretary, FREDERICK A. BROSSY and Flight Commander, LIEUT. CHARLES D. WILLIAMS.

GEORGE A. SPECHT, formerly traffic manager of the Twin Cities-Chicago division of Universal Air Lines, has been made head of the passenger solicitations department of the company on the Chicago-Cleveland-New York division.

MISS MARY VON MACH, of Detroit, first licensed woman pilot in Michigan, has joined the sales and school promotion department of the Curtiss Flying Service of Michigan.

A. D. NIEMEYER, chief flying instructor of the Robertson division flying school of Universal, has gone to the Porterfield School at Kansas City to take over a similar position.

MERLE F. CORNELL, of Sioux City, Ia., has been elected to the board of directors of Mid-West Aviation Corporation.

LIEUT. COMDR. CHARLES E. ROSENDAHL has been ordered to take charge of the Rigid Airship Training and Experimental Squadron, Lakehurst, N. J.

LIEUT. COMDR. HERBERT V. WILEY, has been appointed commander of the Navy airship Los Angeles.

LEWIS W. KING has been named traffic manager of the Thompson Aeronautical Corporation in the Cleveland district.

DAN SAUDER has been elected president of the Knoll Aircraft Company, Wichita, Kan., to succeed T. M. THOMAS, who has resigned.

RALPH E. PEASE, of Hudson Falls, N. Y., has been appointed manager of the Glens Falls, N. Y., Airport.

JOHN W. REID, Detroit commissioner of public works, has been given charge of activities at the municipal airport.

U. N. HOWELL has been elected president of the Rome, Ga., Airport Association.

TRADE TIPS

It has been reported that

Hangars are to be built the following airports and flying fields: Rochester, Minn., A. F. Wright, clerk; Wakpeton, N. D., by the Airport Club, Dr. H. H. Pfister; Monterey Peninsular Community Airport, Monterey, Calif.; Albany, N. Y., Airport, by Mohawk Airways; Omaha, Neb., Municipal Airport, by Mid-West Aircraft Corporation and at Randolph Field, San Antonio, Tex.,

Lubbock, Tex., will start construction of a 640-acre airport soon.

Construction of a $5,000 administration building for the Pacific Air Transport Company will start at the Medford, Ore., airport soon.

The Miami Aero Club, of Miami, Fla., has authorized the purchase of its first training plane, to be used by active club members.

AIRPORTS AND AIRLINES

Universal Makes Operation Changes

CHICAGO (ILL.)—May 1 marked the beginning of several changes of operations in the Universal Air Lines system. Two new passenger services started when the St. Louis, Kansas City, and Omaha run was formally opened and the Chicago, Peoria, Springfield and St. Louis, mail and passenger route got under way.

Universal also announced the inauguration of "The Skyline Limited" between Chicago and St. Louis, on which is operated Fokker Super Universals. This run brought into effect the extra fare charge, established for the first time in this country. The regular fare to St. Louis is $30 but an additional $3 is now charged for the increased speed and added comfort on these big ships. The old morning passenger run has been disbanded and "The Skyline Limited" leaves Chicago at 2:00 p.m. and arrives in St. Louis at 4:40 p.m. Northbound the plane leaves St. Louis at 12:55 p.m. and arrives in Chicago at 2:55 p.m.

The Chicago, Peoria, Springfield and St. Louis run carries passengers and mail. This was formerly only a mail schedule. New equipment of Boeing four passenger cabin planes with a mail compartment has made it possible to carry passengers. This run is known as "The Air Mail Limited."

The St. Louis, Kansas City and Omaha line for mail and passengers, which was formerly opened May 1, is operated with Fokker Super Universals. The St. Louis-Kansas City run, for passengers only, is equipped with Stinson Detroiters.

Also effective May 1 was the equipping of Fokker F-10, twelve-passenger cabin planes on the Chicago-Cleveland run, known as "The Sky Liner." There also was a change in the time schedule. The Sky Liner leaves Chicago daily at 4:00 p.m., arriving in Cleveland at 7:45 p.m. and leaves Cleveland at 7:05 a.m. instead of 6:50, landing in Chicago at 9:00 a.m. This change in schedule has been made to accommodate passengers arriving by train from the east to give them more time to make air connections. The four Hamilton planes formerly used on this line were sent to the Braniff division for use in Oklahoma and Texas.

Autos Advertise Air Mail

LOUISVILLE (KY.)—W. R. Doyle, local manager of the Saunders Drive Yourself Company, has made an agreement with Lyman S. Woodruff, Kentucky traffic manager of Continental Airlines, Incorporated, to use air mail stickers on all of his 40 cars which are rented to the public.

Seattle Seeks New Mail Outlet

SEATTLE (WASH.)—Direct air mail connection between here and the transcontinental air mail route at Salt Lake City has been promised this city, it is reported. Post Office officials were said to have indicated that surveys of the situation will be started in the near future.

New Coast-to-Coast Mail Schedule Starts

NEW YORK (N. Y.)—The new night transcontinental air mail service cutting the transmission time 12 hr. to only 31 hr. and make possible the loss of only one day in the transportation between the coasts went into effect on April 30. In connection with the new schedule changes were made also on various feeder lines. The new schedules for all of these may be found in the April 13 issue of AVIATION.

Two other air mail changes became effective May 5 and 6. Pitcairn Aviation began its seven-days-per-week service on May 5, and on May 6 the New York-Philadelphia shuttle service of the Pitcairn concern was extended to include Baltimore and Washington. This schedule is given in the May 4 issue of AVIATION. These shuttle planes arrive at New York (Hadley Field) at night, and leave New York early in the morning in conjunction with the night transcontinental. The regular New York-Atlanta-Miami plane leaves New York for the South at 9:30 at night and arrives at New York from the South at 4:35 in the morning.

Publish Airport of Entry Data

WASHINGTON (D. C.)—Rules and regulations for the guidance of applicants who desire to have airports designated as airports of entry for civil aircraft arriving in this country and as ports of entry by aliens arriving in the United States by aircraft, have just been developed by the Aeronautics Branch. Copies may be obtained from Harry H. Blee, Chief of the Division of Airports and Aeronautic Information.

California Air Law Vetoed

SACRAMENTO (CALIF.)—An aviation bill adopting the Federal regulations for the State of California has been vetoed by Governor Young, because it does not provide against changes in the Federal law, committing the State to an unknown program, and because there is no clause forbidding low or stunt flying. He says that the Emmitt bill now pending in the Legislature will meet the situation better.

Colonial Sells Air Commutation Tickets

BOSTON (MASS.)—The first commutation ticket for air travel recently was sold to the Jordan Marsh Company of this city by Colonial Airways System, which is operating twice-daily service between here and New York. The ticket is good for 50 trips within a year from the date of issuance and will be used by officials and certain employees of the company.

The company offers two types of commutation tickets. One, a 50-trip ticket, which sells at the rate of $17.43 per trip, a reduction of 50 per cent from the single fare of $34.85. The ten-trip ticket costs $27.88 per trip, a reduction of 20 per cent from the price of the regular single fare.

The innovation is reported by Sumner Sewall, traffic manager of the Colonial System, as meeting with great success. A deluge of requests for the tickets has been received from various New England and New York firms already, indicating that the scheme will go a long way toward stimulating the flow of air passenger traffic. This probably is the first time the idea has been tried in air passenger travel in this country and inasmuch as the idea is in common practice in ground forms of transportation, it is expected to have extensive application.

Cramer Recommends Alaskan Route to Asia

ROOSEVELT FIELD (L.I.)—Parker Cramer and W. S. Gamble landed here May 3 after a flight from Alaska in a Cessna, powered with a Warner Scarab engine. The trip was in the interest of demonstrating the practicability of the Alaskan route to Asia, which he said involved only a 50-mile flight between the continents.

Cramer came here from Alaska by way of western Canada to Minneapolis, Chicago and Cleveland and claims that there is little difference in the distance between New York and Tokyo by this route as compared with the more hazardous trans-Pacific route via San Francisco. He said that neither his plane nor engine had been touched during the trip except for refueling.

Canal Zone Service Starts

BALBOA (CANAL ZONE)—Pan American Airways opened its trans-Isthmian passenger service between France Field and Albrock Field May 1. The planes are to make three round trips daily. Another concern, the Isthmian Airways, is to start similar service very soon.

Pan American-Grace Wins Contract Dispute

WASHINGTON (D. C.)—Pan American-Grace Airways, of New York City, may now proceed with its development of the air mail service between Cristobal and Santiago, Chile, with extension eventually to Montevideo and Buenos Aires. Permission to proceed at once under the terms of the contract granted on March 2 was accorded the Pan American company when the objections of the American International Airways were overruled by the government and the contract was declared valid. The line was to have been inaugurated April 4, but was held up on account of the protest.

Service will be maintained between Panama and Mollendo, Peru, on a weekly basis until about the middle of June and thereafter it will be twice weekly. The extension from Mollendo to Santiago is scheduled for some time about July 1. The Mollendo to Guayaquil, Ecuador, section of the route is being flown by Peruvian Airways Corporation, which is owned by the American concern. It is understood that Pan-American has started regular operation over the route already.

Proposes Airport Over Atlanta R.R. Yard

ATLANTA (GA.) — Construction of a supplementary landing field in the heart of Atlanta has been suggested by Lee Smith, president of the New York Building Owners and Managers Association, in an address before the Atlanta organization.

Mr. Smith's proposal is to construct a concrete landing field above the railway tracks to the west of the Spring Street viaduct, using it for mail and passenger service and supplementing the service given at Candler field, which is eight miles from the business district of the city.

It is pointed out that there is ample space for such a landing field at this location, covering present passenger tracks and switch yards. It is only a few blocks from the business center of the city and is close to the Terminal station, the proposed new Union station and the proposed new post office building.

Pitcairn Repair Base at Capital

WASHINGTON (D. C.)—This city will become a repair base on the Atlanta-New York air mail line within the next few days as a result of the doubling of the air mail service between Washington and New York. Pitcairn Aviation, operator of the line, will have mechanics at Hoover Field and keep a reserve mail plane there for use on this line at all times, it has been announced. Though Hoover Field is to be used for storage and repair work, Bolling Field will continue to be used as the base of operations for the line.

Light Buffalo's Neon Beacon

BUFFALO (N. Y.)—An octagonal Neon beacon, 20 ft. high, has been placed in operation on the 412-ft. tower of the Marine Trust Company here.

Phones From Plane

NEW YORK (N.Y.)—Showing the headphones and transmitter set used here recently in the plane-ground-office radio communication demonstration conducted under the auspices of the Bell Telephone Laboratories. During the flight several passengers aboard the specially equipped Fairchild talked with office stations through regular switchboard connections to the radio ground station. It was reported that voice transmission was excellent for the most part, there being occasional interuptions when the roar of the engine produced a temporary static-like interference.

Texas Air Transport Making Move to Dallas

FORT WORTH (TEX.)—Transfer of about half of the Texas Air Transport, Inc., equipment and personnel from Fort Worth to Dallas, is announced by Tom Hardin, vice-president of the company.

Terminals of C.A.M. route No. 21 between Dallas, Fort Worth, Waco, Houston and Galveston; and C.A.M. route No. 22 between Dallas, Fort Worth, Waco, Austin, San Antonio, Corpus Christie and Brownsville, were moved to this city. The eastern terminus of the passenger route to El Paso was moved from Fort Worth to Dallas recently.

Aeromotive repair operations will be transferred to Love Field, Dallas. A second hangar has been leased from the city to house the augmented activities.

T.A.T. Staff Moves To St. Louis Offices

ST. LOUIS (MO.)—Transcontinental Air Transport, Inc., has taken possession of its headquarters here in the Syndicate Trust Bldg. A personnel of 22 officers and assistants was brought to St. Louis from Washington. The local offices will be in charge of Joseph V. Magee, vice-president, with T. B. Clement as general traffic manager.

Those brought here from Washington include: Don Bartlett, assistant secretary; W. J. Barry, treasurer; Parker Brooks Sturgis, chief of transportation; Pat Murphy and G. E. Everett, assistants to the general traffic manager; Paul F. Collins, general superintendent; E. W. Proctor, radio engineer; John Harlihy, chief engineer; E. J. Stotler, airways engineer; Lloyd A. Stevens, senior meteorologist; E. L. Vidal, meterological engineer; and J. W. Brennan, central traffic manager.

For a short time after beginning operations, the company will use Lambert-St. Louis Field, but later will transfer to Steinberg Flying Field, a 420-acre tract south of East St. Louis, Ill. Steinberg Field is owned by the St. Louis Air Terminals, Inc., a concern organized in March to develop the tract. Improving of Steinberg Field is now under way but is not expected to be completed until about July 1. Depots and the shops of T.A.T. will be there.

Airport Experts To Meet Next Week

NEW YORK (N.Y.)—Working on the theory that an adequate nation-wide network of landing fields and airports is the unfilled need of American aviation, hundreds of airport experts will meet at Cleveland May 15, 16 and 17 to discuss their common problems. Items such as airport construction, airport lighting, radio, weather service and insurance, will be handled by the speakers and airport executives from all over the country.

This is the first national airport conference held under the auspices of the Airports Section of the Aeronautical Chamber of Commerce. Capt. Clarence M. Knox, Connecticut Commissioner of Aviation and vice-president of the Chamber in charge of the section, is heading the group preparing for the event. Speakers and their subjects were reported in the April 13 issue of AVIATION.

Lime Crest Spar Praised

NEWARK (N. J.)—Favorable comments have been made upon the value of Lime Crest Aviation Spar, a crystalline limestone, for marking for field light installations, runways and hangar aprons. The stone has a brilliant whiteness giving it great visibility and is said to pack hard and not "travel" on rounded surfaces. It is being used also at Roosevelt Field, L. I.

Report Progress In Airport Projects

Construction Active Throughout Country

Airport developments continue apace. Colonel Lindbergh appeared before the joint Congressional Airport Commission which is engaged in selecting an airport for Washington, D. C., and urged immediate action. He recommended that more than one airport be planned by the Commission which still is undecided about the site of the first development.

A definite building program providing for the erection of 16 hangars in addition to a central administration building, around which will be grouped in a semi-circle six smaller buildings to serve as ticket offices and headquarters of commercial concerns, is to be presented to the Omaha, Neb., City Commission soon. The plans were developed by W. E. Arthur of the Austin Company, Cleveland.

Curtiss Enlarges Field

Curtiss Flying Service has added 50 acres to the original 270 acres which constitute its new base at Valley Stream, L. I. Enlargement and improvement of Logan Field, Baltimore's temporary Municipal airport has begun. The commercial buildings and hangars there are to be grouped beside the Maryland National Guard quarters. About 47 acres will be added when buildings are razed and the land graded on a tract recently acquired.

New Orleans Municipal Airport is being improved in spite of the transfer of the air mail planes of the Southern Air Transport to Menefee Field. Auxiliary drainage, lighting and grading are on the program. A field day will be held when the improvements are completed about the latter part of this month. The contract for construction of the new municipal airport on Lake Pontchartrain will be signed as soon as permission has been obtained from the War Department and the objections of residents on the lake have been satisfied. This project is considered to have great possibilities.

Iowa City to Vote

Work has started on a field at Poughkeepsie, N. Y. A special election will be held May 27 at Iowa City, Ia., relative to the issuance of $70,000 in bonds for the purchase and equipment of a municipal airport. The present field, leased by the city, contains 137 acres. Last year the Department of Commerce installed $40,000 worth of equipment there.

Improvement of Compton, Calif., airport has been started. This tract is not far from Los Angeles. Twin Falls and Pocatello, Idaho, are seeking new airports. Southern Iowa Airways, Inc., is to establish a flying field and school at Pr ston, Iowa. The proposed Sand Point Naval Air Station near Seattle, Wash., now building, is considered one of the best sites on the Pacific Coast. It is on Lake Washington and has the advantage of the fresh water and lack of tides.

Considerable controversy has followed efforts to install improvements at the Buffalo, N. Y., Airport. Objections by the Mayor to the purchase of 37½ acres of additional land were overcome recently by the city council vote in favor of the project. Steps were taken also to bring about other improvements such as lighting and construction of various buildings and a control tower. Money was made available for the employment of several additional men needed because of the increased airport activities.

Aviation Engineering Corporation, a subsidiary of the Williams Airdrome Development Corporation of New York, is building a 200-acre airport for both land and sea planes on Jamaica Bay, L. I. Six eight-plane hangars are to be constructed.

Build T.A.T. Field

A 200-acre tract has been bought for an airport at Kewanee, Ill. This tract has been surveyed by the Austin Company. Elizabeth City, N. C., is getting ready to build an airport while citizens of Wilmington, N. C., hope to have an airport there in the near future. T.A.T. and the city of Woodward, Okla., are co-operating in the development of a 140-acre tract there. Lighting projects are being carried on at Princeton, Ind.; Denver, Col.; and Hartford, Conn., which also is building a separate office building for the State Commissioner of Aviation.

The Cities Service Oil Company has installed a complete gasoline and oil filling station at the Grand Forks, N. D., airport. Another filling station was installed by the Standard Oil Company about two months ago. Work is progressing on the Ryder, N. D., Airport and it is expected that it will be ready for dedication this month. Construction is progressing also on the Ten Mile, S. C., Airport. Dedication is set for some time in September.

An 80 x 100 ft. hangar is being built at Bennett Field, Binghamton, N. Y. A $40,000 hangar is being completed at El Paso, Tex., for Scenic Airways, Inc. The building is 110x120 ft. in size, and is made of brick, steel and stucco, in Spanish style, with a 40 ft. apron at each side and at front and back doors.

San Jose, Calif., on June 1 will vote on a $350,000 bond issue for the development and construction of a municipal airport. This site adjoins what is known as the San Jose Airport, a privately owned project. Construction is going ahead rapidly on the new Medford, Ore., airport for the development of which $120,000 recently was voted. It will replace Barber field, and is expected to be opened June 1.

Provides Planes For Boat Passengers

NEWARK (N. J.)—Atlantic Air Service of this city, operating at Westfield Airport, has secured an exclusive contract with the Holland-American Line for transportation of passengers on incoming steamers who desire airplane accommodations. Arrangements will be radioed from the steamer. The local concern will provide transportation to the local airport where Cessna and Sikorsky planes will be available.

Will Co-operate On South America Line

WASHINGTON (D. C.)—The Munson Steamship Company and the New York, Rio and Buenos Aires Line have combined to develop the proposed flying belt service between the United States and the East Coast of South America. This is the second recent air-plane-steamship combination, the first being the arrangement between Pan American Airways and W. R. Grace & Company.

The New York, Rio and Buenos Aires Line is seeking permission to operate through Argentina, Uruguay, Brazil, and the West Indian and Guiana possessions of France, Great Britain and the Netherlands, Haiti, the Dominican Republic, Cuba and Porto Rico.

It is understood that the Pan American-Grace concern is petitioning the Argentina Government to cancel the exclusive contract for air mail to the United States it granted the New York, Rio and Buenos Aires concern. It is reported, also, that the latter has secured the concessions of the French Latecoere Company in French Guiana. N. C. Browne, manager of the line, is to fly over the route in a Sikorsky amphibion this month.

To Dedicate More Airports

Among the airports scheduled for dedication, the following have been reported: May 11-12, Hollister municipal airport, Calif., 160 acres; May 15, La Salle-Peru, Ill., Corporation field at La Salle-Peru, Ill; May 20, Enid, Okla., municipal airport; May 23-25, the A. G. Whitney Memorial Airport of the Air-O-Ways Development Corporation at St. Cloud, Minn.; May 31 and June 1, Newton, Ia., airport; May 31-June 2, Welch Airport at Anderson, Ind.; June 1, new 110-acre airport at Binghamton, N. Y.; June 14-15, Memphis, Tenn., Municipal Airport; June 20, Evansville, Ind., Municipal Airport; July 1, Port Columbus, Columbus, Ohio; July 5, Jamestown, N. Y., Municipal Airport.

T.A.C. Opens Lake Erie Service May 14

DETROIT (MICH.)—Four round trips will be made daily between this city and Cleveland by the new Thompson Aeronautical Corporation's service linking the two cities, which starts May 14. Planes will leave Detroit and Cleveland simultaneously at 8:30 a.m., 12:30 p.m., 3 p.m. and 5 p.m. The three Keystone-Loening amphibion planes to be used will be named Miss Detroit, Miss Cleveland and Miss Erie. Two of the machines have been delivered.

Sixty-five-minute service between the two terminals is the aim of the company. The machines will be flown across the lake, thus cutting considerably the flying time required when the shore line is followed, but will be in sight of the shore or islands all the way. Terminals will be on the Detroit River at 7700 East Jefferson Ave., and at Cleveland on Lake Erie at the foot of East Ninth St. The machines will land in the water and taxi up ramps, discharging the passengers on land.

Yellow Cab Opens Mid-West Air Line

MINNEAPOLIS (MINN.) — Minneapolis, Des Moines and Kansas City are now linked by Yellow Cab Airways, operating one plane daily except Sunday each way. The line was inaugurated May 6 when the first plane was flown over the 430-mile route. Two Fairchild 71's are being used.

Schedule calls for departure of a plane from Kansas City daily at 8 a.m., arriving at Des Moines at 10 a.m. and at Minneapolis at 1 p.m. The return trip is made from here at 2 p.m., with stops at Des Moines at 5 p.m. and Kansas City at 7 p.m. Wold-Chamberlain field is used here, the Des Moines municipal airport, operated by Yellow Cab airways at Des Moines, and Fairfax field at Kansas City.

Fare is $28.80, Minneapolis to Des Moines; $22.80, Des Moines to Kansas City, and $51.60, Minneapolis to Kansas City. Russell Reel is president of Yellow Cab Airways.

Braniff Starts New Lines

OKLAHOMA CITY (OKLA.)—Passenger service between Oklahoma City and San Angelo, Tex., was inaugurated by the Braniff Company May 6. A through trip from Tulsa to San Angelo will be made daily each way. Stops will be made at Duncan, Wichita Falls, Breckenbridge, Tex., and Abilene, Tex. Braniff has opened service also between Tulsa and Seminole, Okla.

Plane-Shaped Office Designed

EL PASO (TEX.)—An operations building, shaped like an airplane has been designed here and as soon as funds for construction are available, will be built.

Starting New Line to Canada

SAN FRANCISCO (CALIF.)—Passenger service between this city and Victoria, B. C., is being arranged by the Bollam Air Transport Company.

T.A.T. to Use Automatic Blinkers

COLUMBUS (OHIO)—About 75 20 ft. combination blinker towers and tank houses will be installed in the mountain desert country between Clovis, N. Mex., and Wynoka, Okla., on the route to be flown by T.A.T. Darkness will start the blinker, the sun valve will turn it off in the morning, and servicing will be needed only every six months.

Indiana Operators Organize

INDIANAPOLIS (IND.)—Indianapolis commercial pilots, managers of aviation fields and municipal airports and one representative of corporations manufacturing aircraft or supplies and resident in the state, have organized under the name of the Indiana Aircraft Trade Association. Officers elected are H. Weir Cook, manager of Curtiss Flying Service of Indiana, president; Paul S. Cox, Jr., of Terre Haute, vice-president.

Plans Airport Chain

CHAMPAIGN (ILL.)—A chain of airports through Central Illinois is the plan of Central Illinois Flying Service, Inc., according to a recent anouncement.

Open N. Y. State Weather Stations

ALBANY (N. Y.)—Senator J. Griswold Webb, chairman of the New York State Commission on Aviation, has announced that by yesterday, May 10, the entire 26 weather reporting stations to enable the commission to give a complete weather report service would be functioning. State headquarters of the New York commission have been established in the Federal Building here and to it are wired reports of observations taken daily at 8 a.m. and noon. These reports when tabulated are transmitted to the various flying fields of the state.

There have been in operation for about a month reporting stations at Newark, N. J., Peekskill, Barrytown, Albany, Whitehall, and Burlington, Vt., covering what is known as the New York-Montreal route; and at Little Falls, Syracuse, Rochester and Buffalo covering the Albany-Cleveland route. On May 1, observation stations were opened at Middletown, Hancock, Binghamton, Elmira, Olean and Jamestown on the Peekskill-Cleveland route and at Hornell and Bliss on the Elmira-Buffalo route.

This leaves to be established: Oswego, Watertown, Malone, Plattsburgh and Lake Placid on the Buffalo-Montreal route, and Oneonta and Ithaca stations on the Albany-Binghamton-Rochester route. The Commission also has in mind the establishment of an observation station at Dunkirk on the Albany-Cleveland route.

Curtiss Moves To New Home Field

ROOSEVELT FIELD (N. Y.)—Two great changes took place at this airport May 1. After a tenancy of more than 10 years Curtiss Flying Service moved to new Curtiss Airport at Valley Stream, and Roosevelt Field, Inc., took active charge of operations here. Old Curtiss Field is known as Unit No. 2 and old Roosevelt Field as Unit No. 1. They are being operated as a combined airport.

With 22 airplanes the Curtiss company observed moving day in a novel manner. All employees and as much equipment as possible was carried by air.

The new location is on Sunrise Highway, Valley Stream, near the Long Island Railroad station. It is almost surrounded by farm land and contains over 500 acres, including several houses, barns, and one hangar formerly used by Advance Airport. A large building program is now being arranged.

To Study Capital-Cleveland Route

WASHINGTON (D. C.)—An aerial survey will be made of the air route between here and Cleveland before the end of May in connection with the proposed installation of beacon lights, it has been reported.

FOREIGN ACTIVITIES

National Flying Services Progresses

LONDON, (ENGLAND)—Further developments in the scheme of National Flying Services, Ltd., for the establishment of a national chain of airports and flying schools and taxi services have been disclosed here. Among the directors is Lady Mary Bailey, well known for her solo flight to and from South Africa.

The central airport and country club near London is to be established at Hanworth, where an elaborate mansion already stands. The 22 provincial club airports and 100 intermediate landing grounds, will be distributed within an average interval of about 15 min. flying time. Equipment will include 100 light planes, reserve aircraft and engines, 50 flying instructors and pilots, 50 licensed mechanics and 50 assistants, with a reserve also of inspectors and engineers.

There will be a central repair depot and supply depot, a route information bureau, technical advisory bureau, sales and insurance organizations and meteorological information service. One of the features is that a member of one club is an honorary member of every other club and planes will be available to members throughout the system on the drive-yourself basis. Each club will have two inspectors, two mechanics and engineering and clerical assistants. The central club's facilities will include six hard and six grass tennis courts, squash racquet courts, barroom, dining, lounge, bar and sleeping accommodations.

The national organization has been appointed agents for the continental air passenger lines and will pay particular attention to taxi work to meet the departure and arrival of big liners. Transportation in this taxi will be about $.25 per mile. The value of the reserve of machines and personnel will be to eliminate delays due to damage or accident or other operation difficulties.

Belgian Aviation Expands

ANTWERP (BELGIUM)—On April 29 the local aerodrome as well as air service between this city and Hamburg were inaugurated. Air services between Antwerp and Berlin, London and Strassburg will be started next year by Sabena corporation of Brussels and the Belgian Government has been permitted to grant the Sabena concern a subsidy of 164,000,000 Belgian francs, covering a period of eight years. The new air connection between Belgium and Belgian Congo will be operated by Sabena in collaboration with a French company.

German Lines Over-Developed?

LONDON (ENGLAND)—The recent cut in the budget for German air transportation is considered here to be due to an over expansion of the network of air lines, so that even under a heavy subsidy there was not sufficient demand to justify the facilities. The English see in this retrenchment a justification of their more conservative policy of development.

Foreign News Briefs

Capt. Hermann Koehl and Col. James Fitzmaurice have postponed their proposed trans-Atlantic flight for at least a year.

Recognition as the foremost Brazilian aviator has been accorded Comdr. Dante de Mattos of the Brazilian Navy.

Air mail service from Santiago and Chile is being arranged for early inauguration.

Further reports on English plans for a passenger and mail service to South Africa are reported to include a definite schedule which will occupy about 12 days, Great Britain paying more than half the subsidy necessary and South Africa about $400,000 yearly for six years. Headquarters and repair shops will be established in South Africa.

In spite of bad weather during February, K. L. M. reports a high degree of regularity in service.

Special arrangements have been made in Italy for the entrance into the country of air tourists without the usual formalities.

Fairchild Aircraft Ltd., of Canada, had an extensive exhibit at the exhibition staged by the Montreal Light Airplane Club last week.

Pedro A. Chapa recently was awarded an air mail contract for the route between Mexico City and Nuevo Laredo. He plans to use five tri-engined machines and start operation very soon.

Captain Ahrenberg, who is planning a non-stop flight from Stockholm to New York, recently bought a single engined Junkers seaplane of the "Bremen" type for the trip.

An association of commercial airplane operators and manufacturers of aircraft and airplane accessories is being organized in Montreal.

Western Australian Airways, Ltd., expects to open its mail and passenger service through from Sydney to the West Coast of the continent in June.

Germany's proposed rule prohibiting aircraft bombing in wartime failed recently before the Preparatory Disarmament Commission.

Airships to Fly Across Atlantic Soon

BERLIN (GERMANY)—The two forthcoming trans-ocean flights of the German and English dirigibles represent the climax of a period of informal rivalry in lighter-than-air programs. The Graf Zeppelin is scheduled to cross to America on or about May 15, while in England the giant R-100 commercial airship is being groomed for a trip to this country and Canada the latter part of May or early in June. Its sister ship the R-101 is expected to be ready by the end of June.

During the recent Mediterranean cruise of the Graf Zeppelin the propeller shaft of one of the engines was changed. This involved also removing and replacing the propeller while in flight. The tests of the dirigible's radio system in conjunction with United States Naval Radio Stations were unsuccessful. Its proposed round-the-world trip is now scheduled for July.

Air transportation facilities between Germany and Scandinavian countries were in tremendous demand in March when ice tied up surface transportation.

The second general meeting of the Guild of Air Pilots and Air Navigators of the British Empire has been held in London. A foundation Council was elected to supervise the organization.

Three De Havilland Moths have been sold to purchasers in Mexico through H. G. Fletcher, Mexico City agent.

Fifty light planes known as the Potez 26 powered with the Salmson five-cylinder radial air-cooled 60 hp. engine are being built in France, the first French attempt to produce in quantity planes for private use.

It is reported that the Rohrbach Rostra, two-engined flying boat, will be ready for a proposed trans-Atlantic flight some time this month.

Exhibitors signed up so far for the Southern International Aero Exhibition at Olympia, England, in July, are 25 for the aircraft section, 19 for the engine section and 127 for the accessory and component section.

Three Dornier Wal flying boats for the Dutch Royal Navy are on their way to Batavia where they probably will arrive about the 20th of this month.

Three hundred passengers, almost seven tons of mail and two tons of freight were carried by London, Ont., Air Transport Company planes this winter on the Leamington-Pelee Island service.

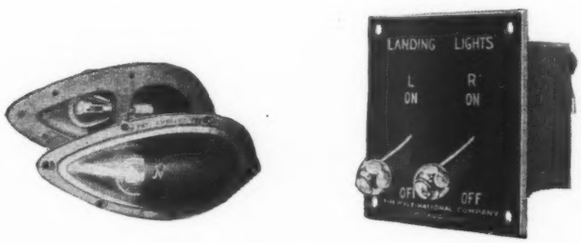
LIBRARY

THE BUYER'S LOG BOOK

Pyle-National Switches and Lights

LUMINOUS tipped toggle switches for airplane lighting systems is one of the recent developments of the Pyle-National Company, 1334-1358 North Kostner Ave., Chicago. These special long handled toggle switches have a quick make and break mechanism inclosed in a pressed steel case. The entire mechanism is heavily insulated to prevent trouble from short circuits and grounds. The tip of the switch handle is provided with a luminous insert which gives the location of the handle readily in the dark. Switches of this type can be furnished in two current capacities, the first, or 10 ampere, 15 volt capacity, is made in one, two and three gangs. The second, or 35 ampere, 15 volt capacity is made in two gang only.

The 10 ampere switches are for use with type Lan-600 Pyle-National landing lights and miscellaneous lights. The 35 ampere switch is for use with the type Lan-900



The Pyle-National running light (left) and landing light switch (right)

Pyle-National landing lights. Switches are mounted on a sub-plate and are covered by the front mounting plates.

Another recent addition to the Pyle-National line is the aircraft "Avigation" (running) light. These lights are designed to give maximum distance and angular visibility and are made in two types. The type for tail mounting has clear glass shells while the type for wing mounting is made right and left. Green glass shells for right wing and roofing glass shells for left wing are provided.

The arrangement of these lights is such that they will fit either thick or thin wing or rudder section with equal ease, as each light is made in two independent parts. This arrangement also permits the use of either one or two 3, 6 or 15 CP lamps.

U. S. Rubber Products

INCLUDED in the aeronautical products of the United States Rubber Company is a complete selection of U. S. Royal airplane tires and tail wheel tires as well as inner tubes. Sixteen tire sizes are offered including three tail wheel sizes. These are 10x3, 14x3 and 16x4.

Royal cord airplane tires are made in accordance with army and navy specifications and are used by both branches of the service. To facilitate proper mounting on drop center airplane rims, a fine line guide mark is placed on the tire side wall which appears at the top of the rim flange when the tire is mounted on the wheel. The anti-skid tread on Royal cord tires for use on airplanes with brake equipment is the result of study to provide an effective anti-skid surface in the shallow depth necessary for airplane operation without increasing the weight of the tire and without creating a tendency to throw mud when operated on wet landing fields.

The tail wheel tires are built with the same care as the tires of larger size and they are so constructed as to provide for rough landings.

United States Royal airplane tubes are made from specially compounded light gravity high tensile stock. Tubes are cured to shape and designed to fit properly on drop center rims. These tubes are made in accord with Army and Navy specifications.

Other aeronautical products of the company are rubber hose and tubing, grommets, shock absorber disks, elastic shock absorber cords, gloves, air pillows, sheathing and rubber mountings for airplane engines. Hard rubber products for airplane uses can be furnished to specification.

Blaw-Knox Hangars

INCLUDED in the standard buildings manufactured by the Blaw-Knox Company, Pittsburgh, Pa., are five general types of hangars. These hangars are constructed from standard units and are available in sizes and designs to meet the various requirements. In all cases provision is made for modification or extension of existing equipment by the addition of new standard types. These buildings may be dismantled and re-erected in new locations without loss.

Walls and roof sheets of copper alloy galvanized steel are interlocked in such a way that no crevices are left to invite corrosion. These hangars are watertight and contraction and expansion cannot create cracks or holes to admit weather. Metal doors for these buildings can be provided to suit various requirements. Steel sash of standard design with ventilating sash and operating hardware also are provided.

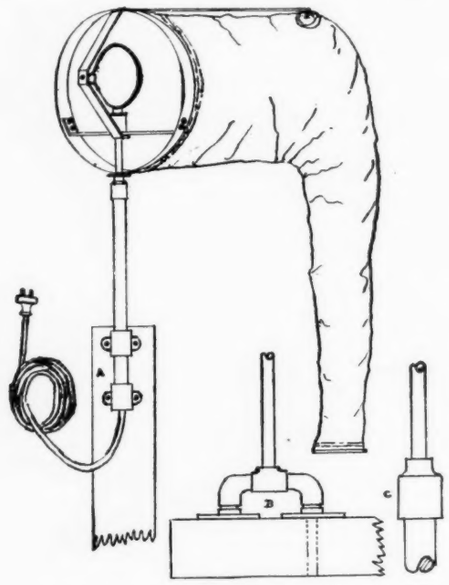
The type B hangar is made with standard heights under trusses of 8 to 20 ft. This design is available in eleven different widths ranging from 16 to 60 ft. The type W1 provides a clear span width ranging from 20 to 120 ft. This model is made in standard clear heights under trusses of 11 ft. 7 in. to 23 ft. 7 in. Lean-tos are provided with the type E hangar which is furnished in approximate widths of 80, 90, 100, 110 and 120 ft. The lean-to heights are 12, 16 and 20 ft.

The type BB is made in heights of 12, 16 and 20 ft. for buildings 40, 50 and 60 ft. wide. The approximate unit widths are 30, 40, 50 and 60 ft. The type W3P is made in widths from 60 to 180 ft. with standard clear heights under trusses of 11 ft. 7 in. to 23 ft. 7 in.

These buildings may also be used as store rooms and machine shops and if desired can have walls and ceilings lined to serve as wash rooms, lacquer rooms, offices, etc.

American Equipment Wind Cones

WIND cones of interesting design are now being offered by the American Equipment Company, 5958-60 Washington Blvd., Chicago. These cones are available in both lighted and unlighted models, both types having the same general specifications. In the illuminated types a light is provided inside of the cone and turns with the cone, illuminating the entire figure. The cone is supported by an arm extending about one-third of its length and leaving the remaining two-thirds of the length free to sag in the wind. The wind velocity may be estimated by observing the angle of sag



A drawing of the illuminated wind cone showing various types of mounting

in the free end. All metal parts are lacquered black to prevent rust from forming. A concave silver mirror held in a brass spinning magnifies and concentrates the light inside the cone.

These cones are made of U. S. Government specification cloth, have a maximum diameter of 20 in. and a minimum diameter of 6 in. and are 7 ft. long. They are ordinarily provided in white but may also be furnished in orange color. Each of the illuminated types are provided with weatherproof Edison base sockets, 100 watt, 110 volt inside frosted lamps, armored attachment plug and 25 ft. of heavy rubber cord. Three choices of mounting screws are provided. The cones may be mounted on a vertical post, horizontal post or a standard type mast. Replacement parts are carried in stock by the company.

Tycos Strut Thermometer

AN ACCURATE thermometer especially developed for flight test work has been placed on the market by the Taylor Instrument Company, Rochester, N. Y. This instrument, which is known as the Strut Thermometer, is designed to be mounted on a strut where its large figures drawn off on the mounting and red permacolor make it plainly readable from the cockpit. The size of the strut thermometer is $27\frac{1}{2}$ by $3\frac{3}{4}$ in.

SIDE SLIPS

By Robert R. Osborn

We were out to Roosevelt Field, formerly Curtiss Field, in Garden City, L. I., on May first, when the Curtiss Flying Service flew out of its old home port to the new Curtiss Field at Valley Stream. A sad sight it was too. The clouds hung low and dark and the field was wet with the frequent showers. The ships seemed to pull off the old ground reluctantly, treading quietly, with a long low turn above before heading off. The hangars which had gladdened the eyes of so many "generations" of homecoming flyers seemed suddenly to become so old and gray and hopeless. There were some honest and unashamed tears in the eyes of many who were flying away and many who were watching them go. Curtiss was leaving.

The little boy, now grown to manhood, was leaving the old homestead to make his way in the world.

• • •

"London.—With more than 12,000 letters, the first airmail from India arrived punctually at the London airport this afternoon, and four passengers who had breakfasted in India last Sunday morning were able to lunch in London seven and a half days later."—N. Y. Times news item.

We do hope it was a good breakfast.

• • •

A news item states that Alice, the 472 pound young lady connected with the side show of Ringling Brothers' circus, is planning to take an airplane ride.

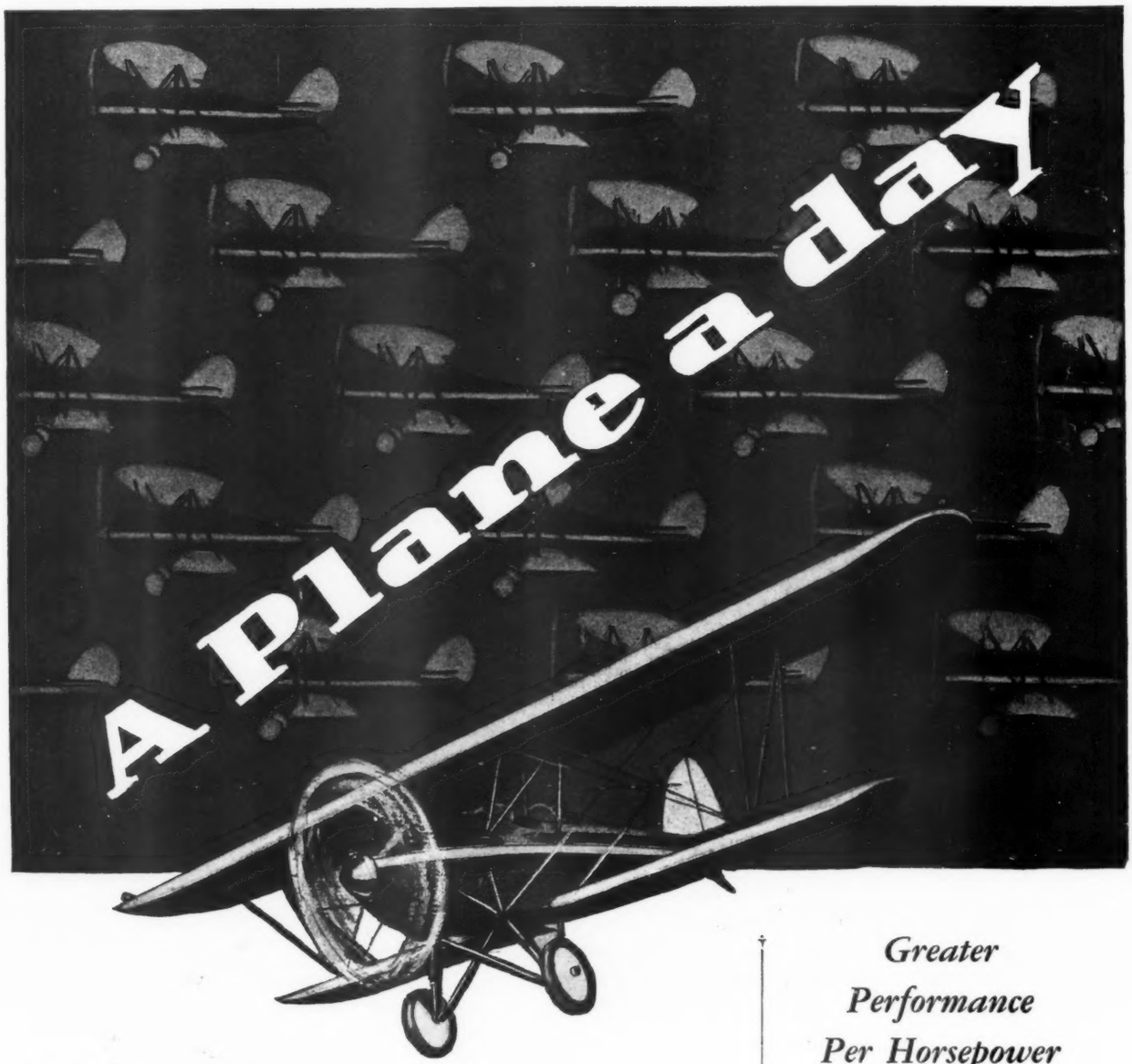
This reminds us that we must renew our search for the professional passenger that all of the airplane companies must use in obtaining their performance data. According to our calculations on some of the ships he must weigh about thirty-six pounds and have a perfectly streamlined head.

• • •

The Intrepid Aviator dropped in to say that he sees where Henry Ford has announced reductions in the prices of his airplanes of from $7,000 to $10,000, but that he won't be interested in any new ship until someone offers him a good trade-in deal on his "Jenny."

• • •

While talking to the Byrd Expedition over the radio recently, Mayor Walker of New York told them that when they returned that city would "turn loose with its big heart" and give them a great reception. Aside to Commander Byrd: The New York telephone directory is now so large it takes a good man to even tear it in half. There has been tremendous activity on the Stock Exchange lately and there must be tons of ticker tape lying around the New York offices. Better make your home-coming entry at New Orleans or San Francisco.



ONE BIRD A DAY . . . a production schedule assuring dealers prompt delivery . . . adds to BIRD leadership in the popular priced class which sound design and practically tested performance have already established.

Dealers' franchises for this plane are still available in some territories.

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Safety and Performance

Brunner-Winkle Aircraft Corporation

7 Haverkamp St. Glendale, Brooklyn, N. Y.

Greater Performance Per Horsepower

—the keynote of BIRD leadership

Performance data with Curtiss OX-5

High Speed	120 M. P. H.
Landing Speed	35 M. P. H.
Cruising Speed	100 M. P. H.
Gas Consumption at 100 M. P. H.	5 gal. per Hr.
Take Off Run	100 Feet
Rate of Climb	1,000 F. P. M.
Absolute Ceiling	20,000 Feet
Endurance at Cruising Speed	9 Hours

NO FIELD TOO SMALL . . .
NO TREE TOO TALL

THANK YOU *for mentioning* AVIATION

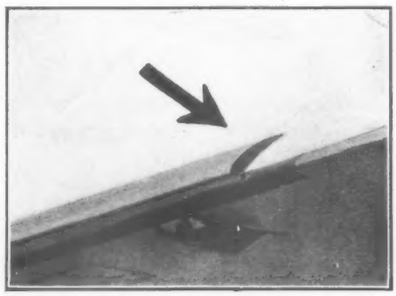
Danger that lurks in a FROZEN STICK is eliminated

By Design and Equipment the Whittelsey Avian is the finest plane in the world for training and sport.

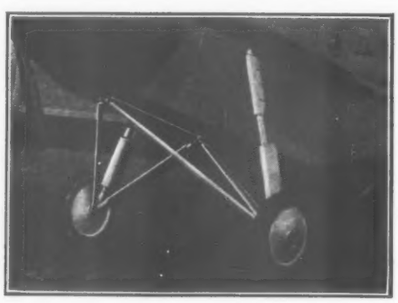
In the records it holds the Avian has a real claim to fame—England to Australia, first solo flight—longest flight in a light plane—fastest time England to India—longest solo flight ever made.

But this famous light plane has made its real record in training and in club flying. It is regarded as the safest, most dependable and most airworthy light plane in the world.

SPINS ARE OUT. Equipment includes one of the greatest achievements of modern aerodynamics — the Handley - Page automatic slotted wing. The slotted wing accomplishes the following: Permits stalled turns without falling into a spin—enables ship to regain flying speed after stall with less loss of altitude than usual—materially improves lateral control by decreasing the counteracting yawing moment—decreases landing speed—practically eliminates possibility of ship going into spin in clouds or fog.



SAFER LANDINGS. Split-axle undercarriage with its unusually wide track, exceptional strength and greater resilience insures safer landings on rough ground. The Whittelsey Avian can be turned in its own length.



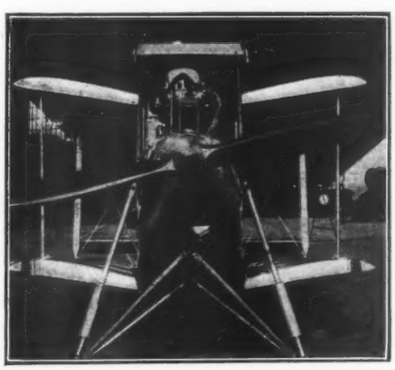
A.V. Roe AVIAN

IN ENGLAND

WHITTELSEY AVIAN

IN AMERICA

THE OUTSTANDING SPORT AND



Designed for the sportsman too. The wings of the Whittelsey Avian can be folded by one person in a few moments. The telescopic jury struts, which must be placed in position before folding, are automatically slipped under the upper wings when not in use. With the wings folded, the Whittelsey Avian can be housed in a small shed.

For comfort in flight, for ease of maintenance and economy of operation, for manoeuverability in the air and on the ground, no other light plane can approach the Whittelsey Avian in performance. It is the plane that will contribute to the flying instructor's reputation as a safe pilot.

SPECIFICATIONS

Power Plant: Cirrus Mark III, 95 H.P. air-cooled, four-cylinder in-line aircraft engine. Famous for economy of operation and maintenance. Top overhaul at 200 flying hours. *Economy of Operation:* 20 miles to gal. of gas—500 miles to gal. of oil—*Speed:* Maximum, 102 m.p.h.; cruising, 85 m.p.h.; landing 35 m.p.h.; —*Ceiling:* 18,000 feet—*Cruising Range:* 5 hours or 430 miles—*Weight:* Light, 875 lbs.;— *Aerobatics:* 1450 lbs.;—Top, 1600 lbs.—*Dimensions:* Wings span, 28 ft., width folded, 9½ ft.—height overall: 8½ ft., length overall: 24 ft.—*Price:* Only $4995, Flyaway or F.O.B., Bridgeport, Conn.

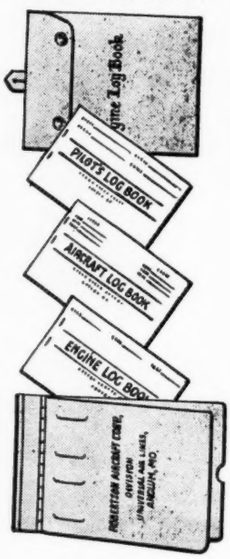
Money To Be Made—Now we are proceeding with national distribution. Rich territories are still open to reputable dealers and distributors. For complete information concerning representation, sales plan and detailed story of this famous light plane, write the Whittelsey Mfg. Co., General Office and Plant, Bridgeport, Conn. (formerly the Whittelsey Body Co.)

TRAINING PLANE IN THE WORLD

Aviation has Awaited a Reliable Aeronautical Supply House

. . . and

Illustrated at right:
Wheel Discs, all sizes. Die stamped. Fine, accurate. 26x4 discs. $3.00 pair.
Bolts, Nuts, Clevis Pins, Guaranteed — and genuine — AN nickel steel, all sizes.
Navigation Lights, regulation style, $15.00 set.
Spinner Caps, accurately turned, finely finished. $2.00 for most sizes.
Tubing, streamline and round. Chrome-moly low carbon and aluminum.
Wheels. Every popular size at attractive prices.
All other supplies, too.



Log Book Set.
Waterproof cover 50c.
Pilot's and Engine logs, 50c. each.
Aircraft log, 75c.
Aluminum binder, $1.50.
Complete set, three books and binder, $3.00.

Robertson meets the increasing demands for a fine, complete stock of all supplies

The aeronautical industry, with its hurried needs and ever-increasing demands, has placed a premium upon prompt service and the ability to furnish every known supply or accessory—and the industry also has placed a premium upon the dependability and the genuineness of every product.

By stocking—completely—only AN specification and the standard, better known, commercial products, we can unqualifiedly guarantee every item we carry. By carrying a complete, full line of every supply, we can make prompt shipment and meet every aeronautical need.

—and by a large business volume, the largest in the industry, we can offer the lowest prices.

Guaranteed AN bolts, nuts, clevis pins, tubing, and other manufacturing supplies—fabric, dope, instruments—all Hisso and OX5 motor parts—all flying equipment—everything on hand

And, by appointment, we are an authorized Wright Parts Dealer with parts for the popular Whirlwind motors ready for immediate delivery.

Our new parts and supply catalogue—completely representative, authoritative, and honestly helpful—is now in the hands of the printers, ready for mailing soon. And a catalogue envelope now awaits your name and address for one of the advance copies. Mail in your request now.

Dept. W

Robertson Aircraft Corporation

All Aeronautical Supplies

Lambert-St. Louis Airport, Anglum, Mo.
Division Universal Aviation Corporation

N556

Britain's Air, Land and Sea Triumphs!

The Napier aero engine has given Great Britain pre-eminence in the air, on land and sea

¶ SPEED IN AIR

The highest speed ever accomplished in the air was achieved by Flight-Lieut. D'Arcy Greig, D.F.C., A.F.C., in November last, when he covered three kilometers at the marvelous average speed of **319.5 m.p.h.** He flew a Super-marine seaplane with Napier engine. This same machine and engine, piloted by Flight-Lieut. S N. Webster, A.F.C., won the Schneider Trophy at Venice in September, 1927, at an average speed over 200 miles of **281.669 m.p.h.**

¶ SPEED ON LAND

The highest speed ever attained on land was made by Major H. O. D. Segrave when he drove his Irving-Napier car over one mile at the amazing speed of **231.36 m.p.h.** He used a Napier engine.

"Please accept my sincerest congratulations on the performance of the two Napier engines installed in the Golden Arrow and Miss England, both of which completed their task without at any time giving the slightest cause for anxiety. SEGRAVE."

¶ SPEED ON SEA

The world's motor-boat speed championship was won at Miami by Major H. O. D. Segrave, driving Sir Charles Wakefield's Napier-engined "Miss England."

¶ RELIABILITY

The greatest formation flight ever attempted was successfully accomplished in 1928 with Napier engines. Four Super-marine "Southampton" flying boats, each fitted with 2 Napier engines, flew from England to Australia and back to Singapore, covering 180,800 engine miles, without mechanical trouble.

NAPIER

The finest aero engine in the World

D. NAPIER & SON, LTD.
Acton, London, W.3

International Aircraft Exhibition London July 16th to 27th, 1929

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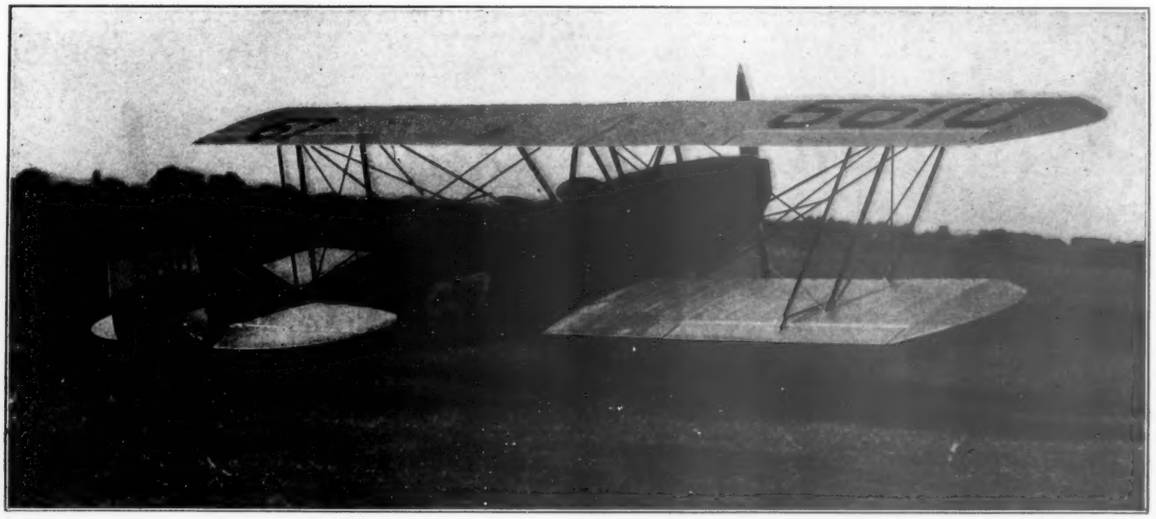

Announcing

. . . *the* REMOVAL *of the*

PHEASANT AIRCRAFT COMPANY PLANT

to Fond du Lac, Wisconsin, *from*

MEMPHIS, MISSOURI

WE are pleased to advise our many Pheasant owners and prospective buyers that arrangements have been made to move our entire operations to Fond du Lac, Wisconsin.

Fond du Lac—our new home—is a busy industrial city, ideally located, being on the main line of the Soo Line and Northwestern Railways; also a branch of the Chicago, Milwaukee and Saint Paul. Concrete arterial roads lead to Fond du Lac from all directions.

Here we move into a modern manufacturing plant, and have one of the finest airports in the State of Wisconsin.

This has also brought added and ample capital with able managements into our organization.

The manufacture of the popular

PHEASANT BIPLANE
(approved type No. 36)

will be continued here on a larger scale than was possible heretofore.

This makes it possible for us to supply additional distributors and dealers with our

Three Place BIPLANE, OX 5 Motor
$2,895.00 F.A.O.F.

Profit making discounts. Special instruction rates to PHEASANT buyers. School in connection.

PHEASANT AIRCRAFT COMPANY, Fond du Lac, Wis.

How Do You Train Your Welders?

AN important feature of Linde Process Service is aid in the selection and training of welders for specific tasks. This helps secure uniformity in both the appearance of the completed product and the strength and tightness of the welds. Linde Process Service can also help you lay out a system for training apprentices, thus assuring a dependable supply of experienced operators.

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The Linde Air Products Co.

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Prest-O-Lite
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The Best of Everything for Oxwelding and Cutting

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30 East 42nd Street, New York, N. Y. In principal cities of the country

64 Linde Plants—45 Prest-O-Lite Plants—154 Oxygen Warehouse Stocks—138 Acetylene Warehouse Stocks—38 Apparatus Warehouse Stocks —235 Carbide Warehouse Stocks

The Eyes of

THE WORLD'S GREATEST AIRMEN ARE PROTECTED BY

LUXOR GOGGLES

Practically without exception, pilots who have spanned the oceans, explored the polar wastes and broken airplane speed, endurance and altitude records have staked their lives on Luxor Goggles.

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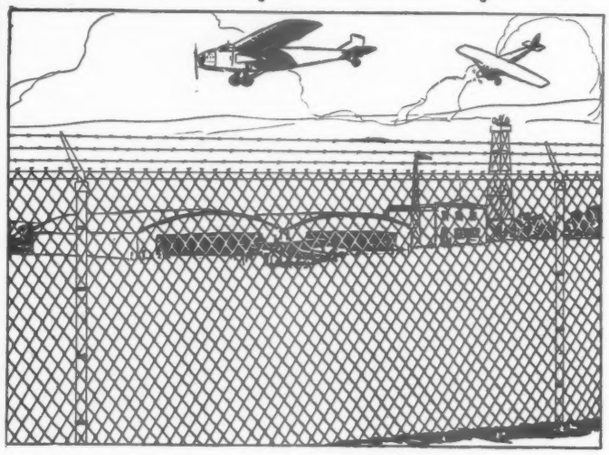

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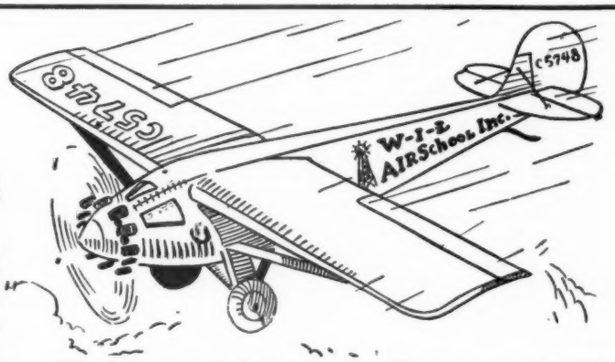

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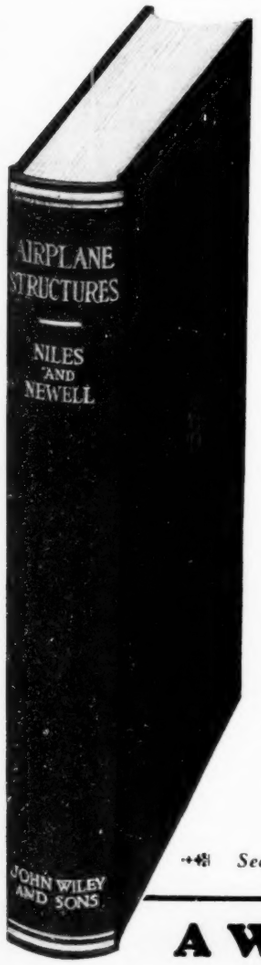

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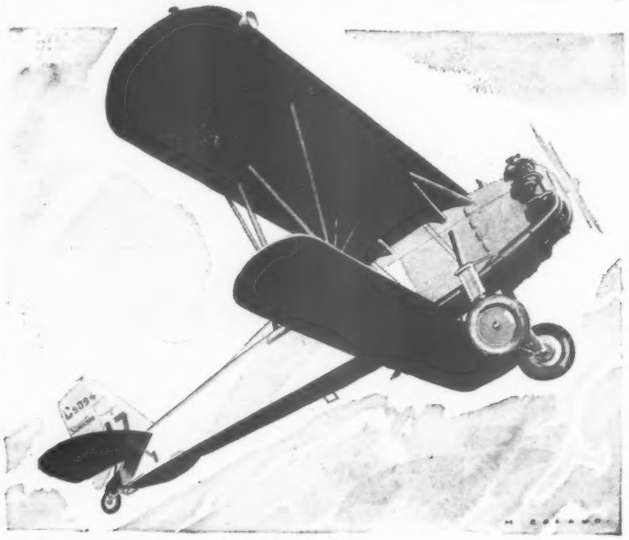

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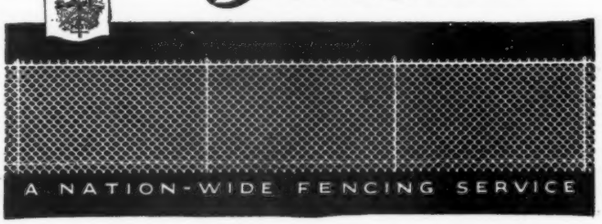

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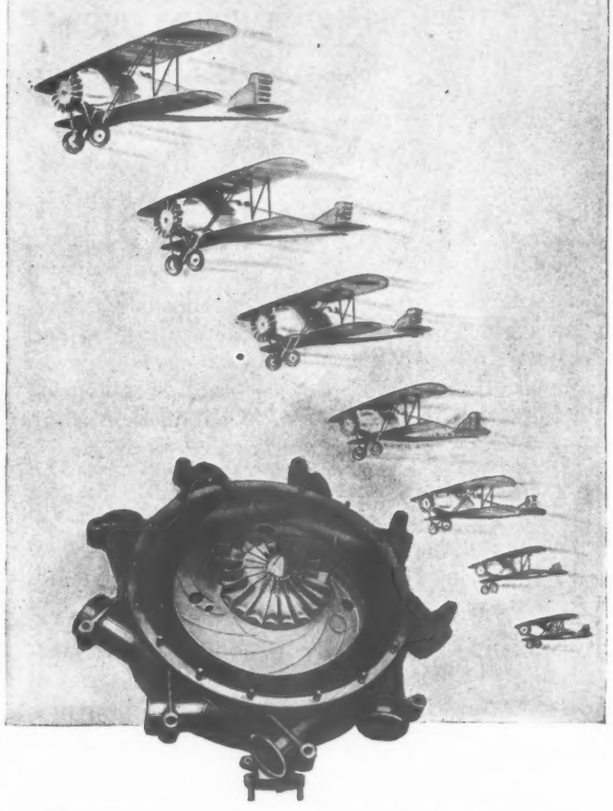

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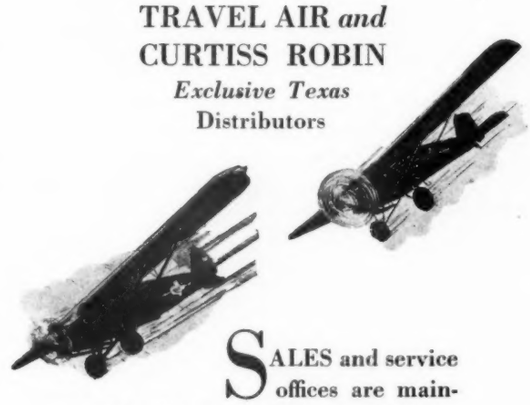

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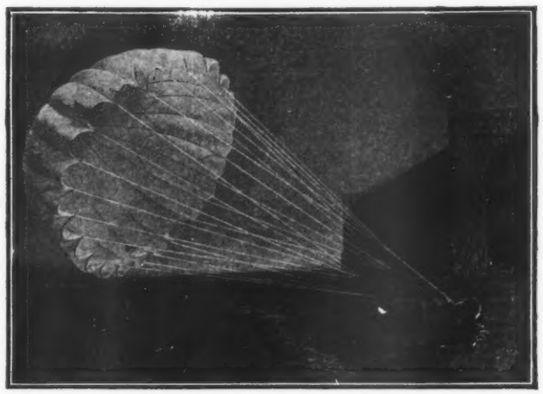

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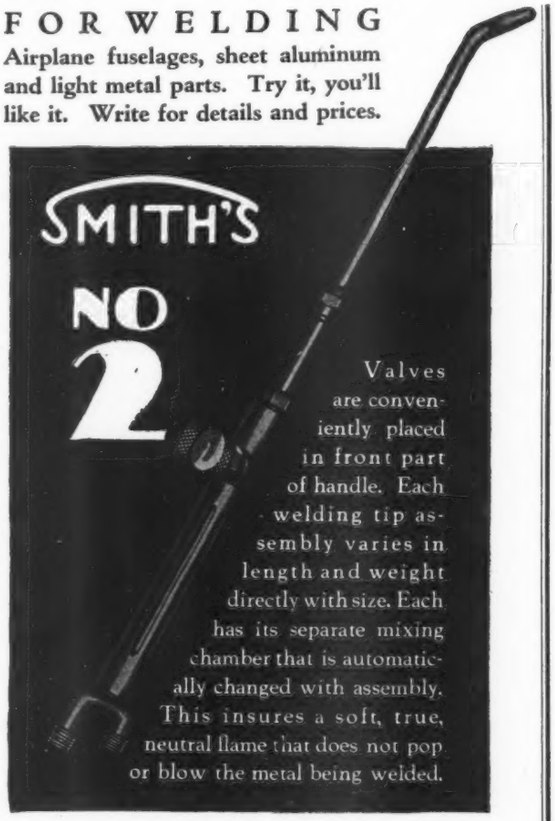
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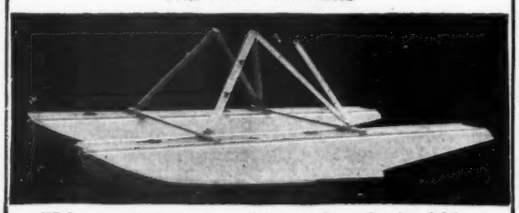

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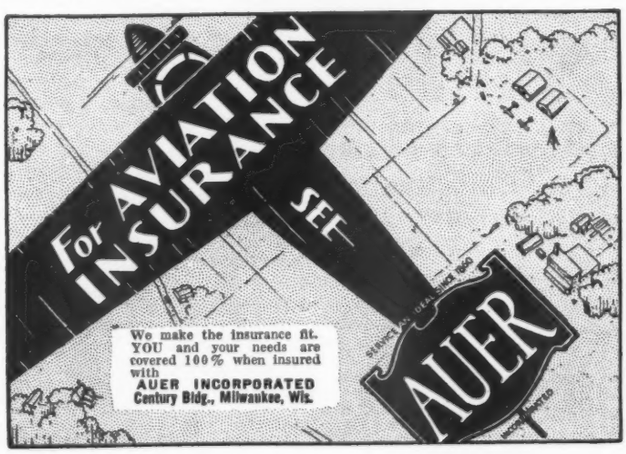
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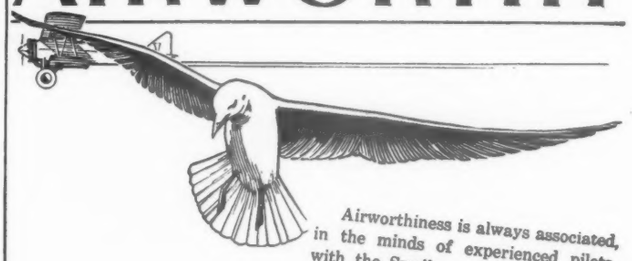

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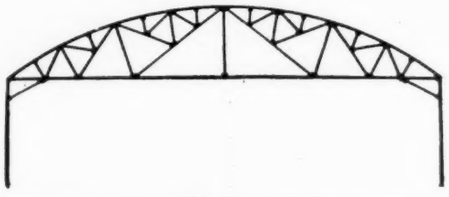

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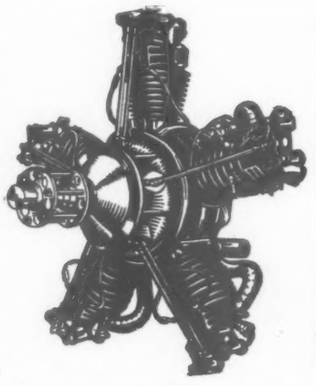

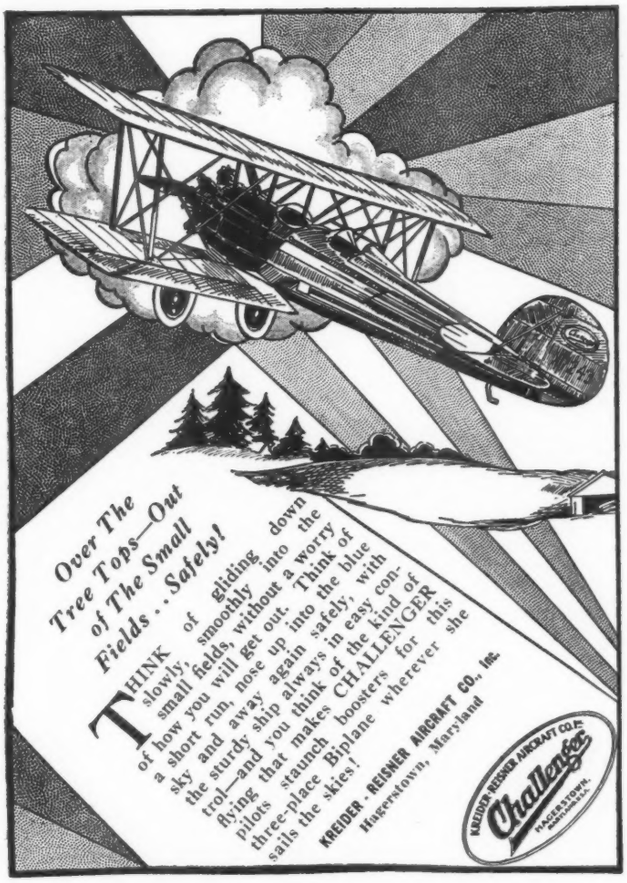
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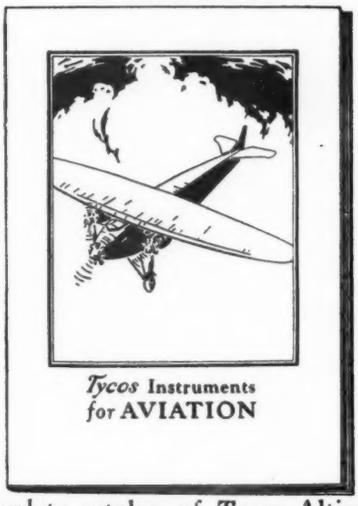

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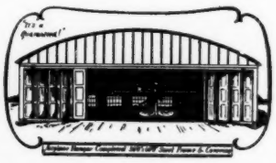

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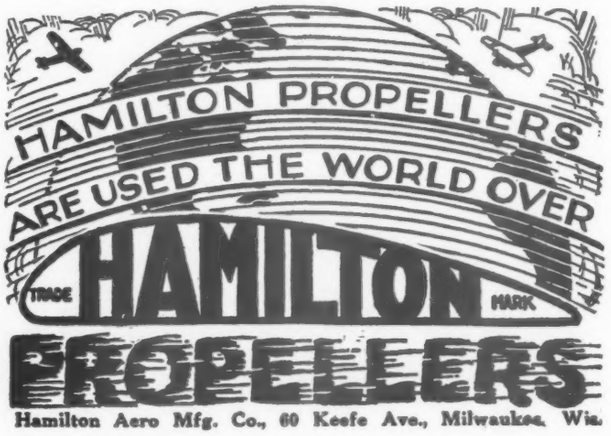

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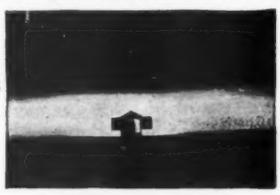

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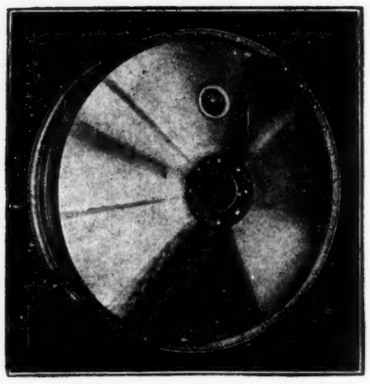

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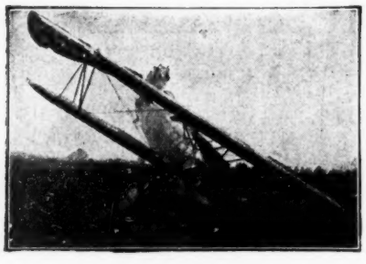

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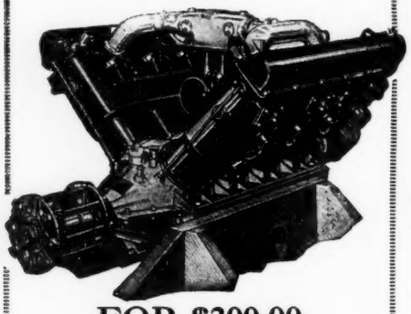

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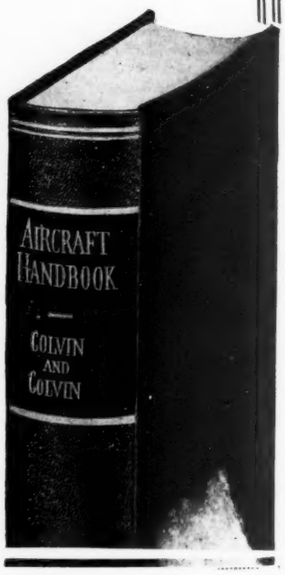

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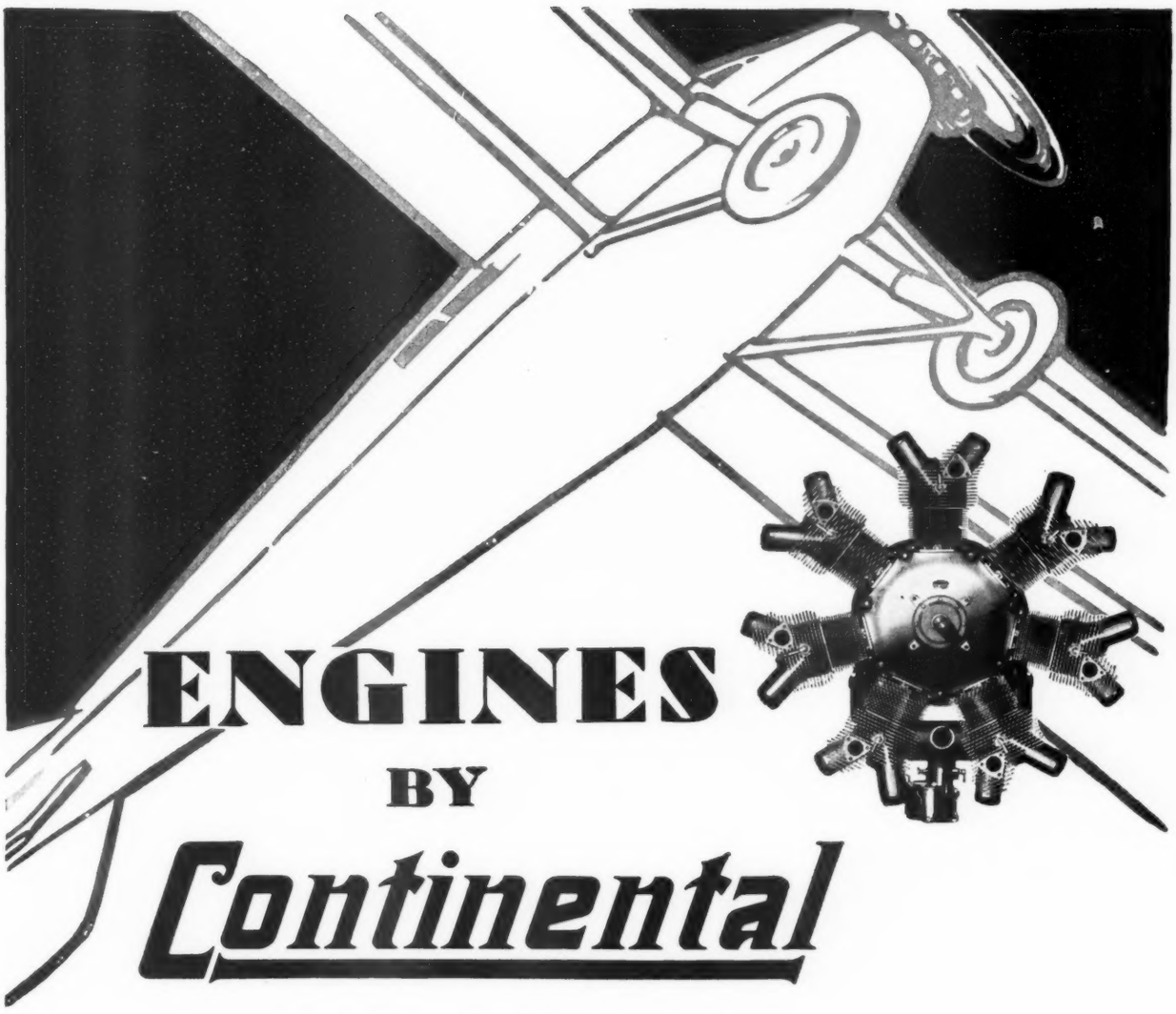

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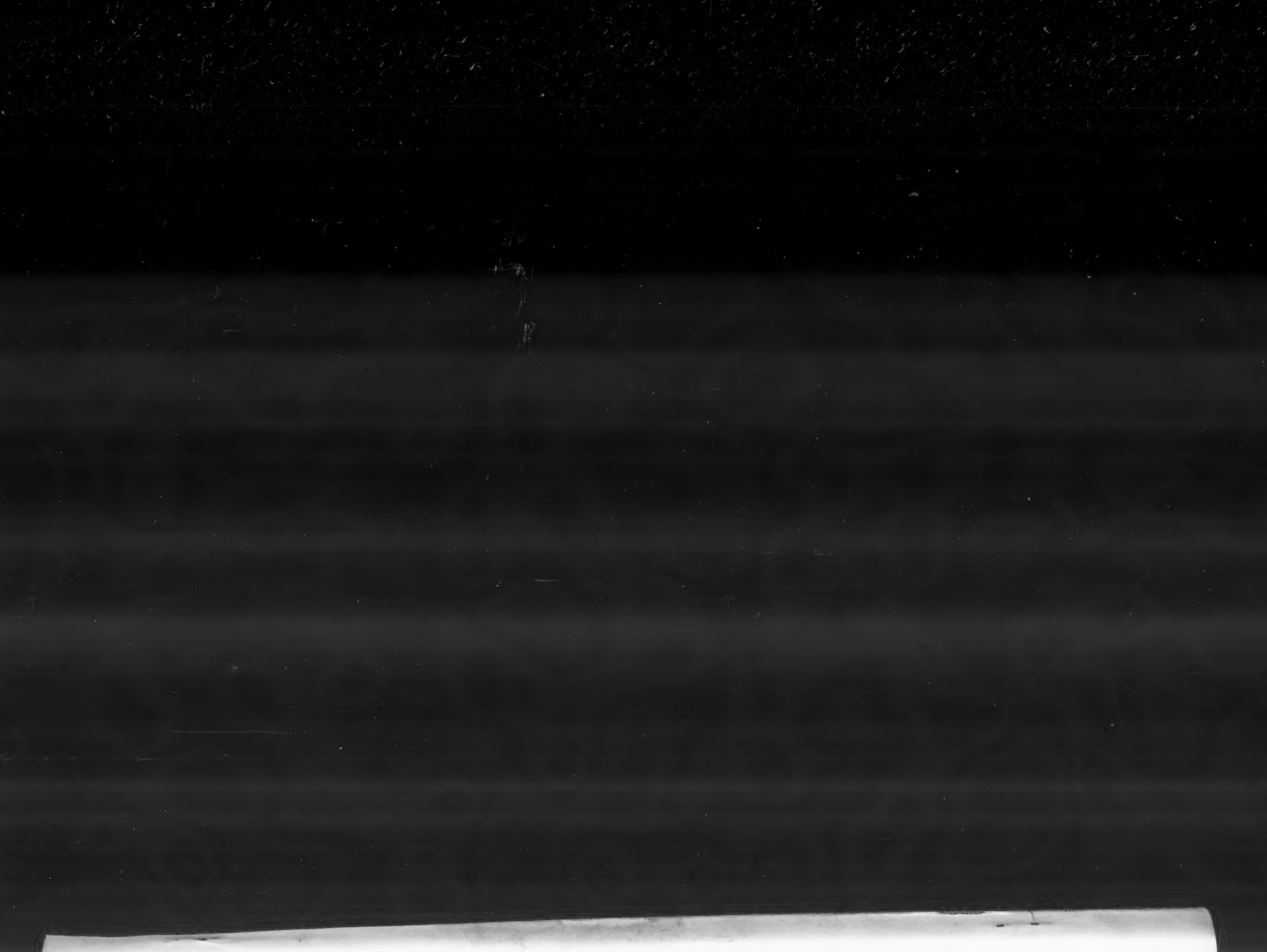
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